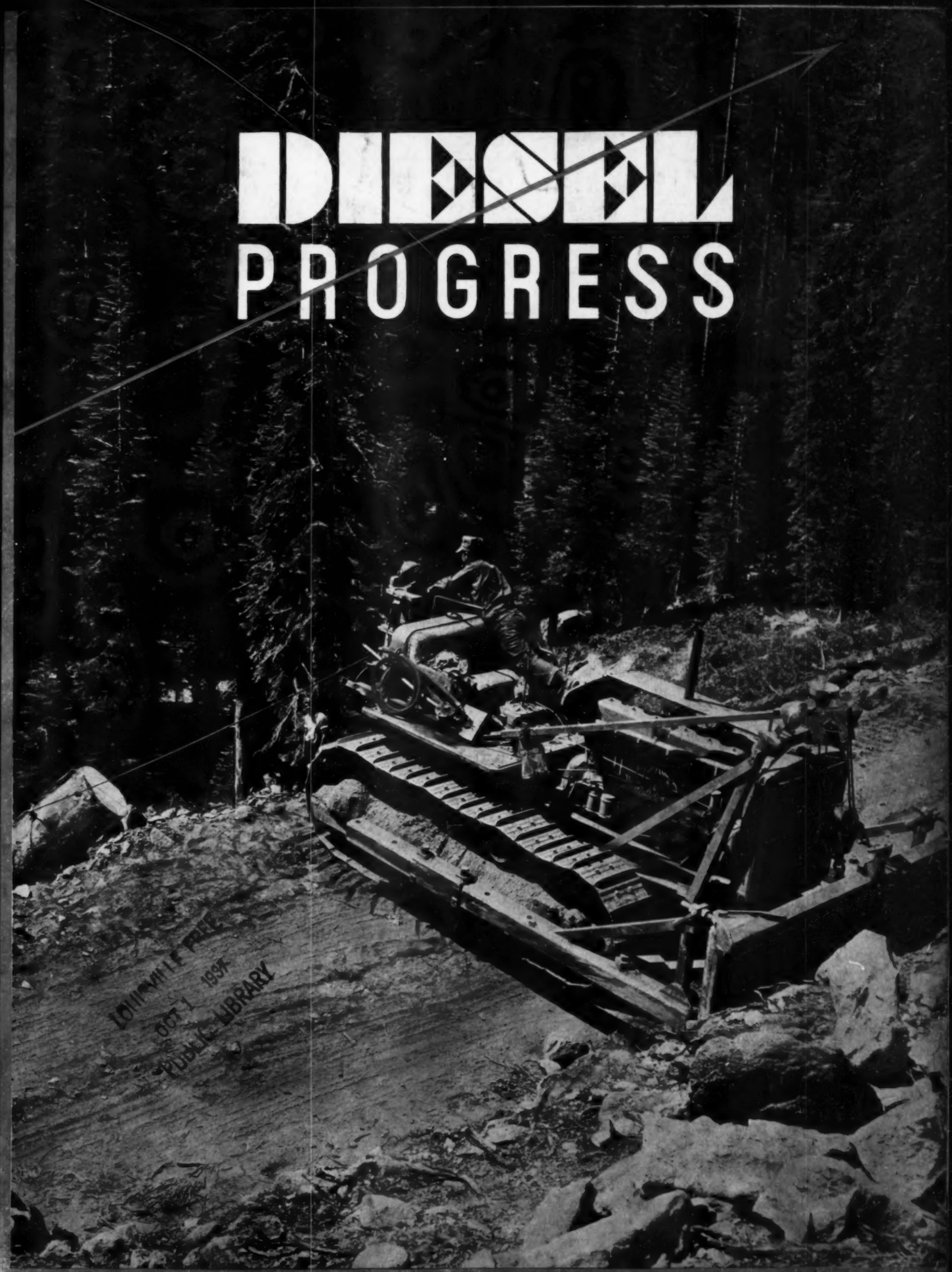
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



OCTOBER, 1936 CIRCULATION OF THIS ISSUE—IN EXCESS OF 11,000 COPIES 25c

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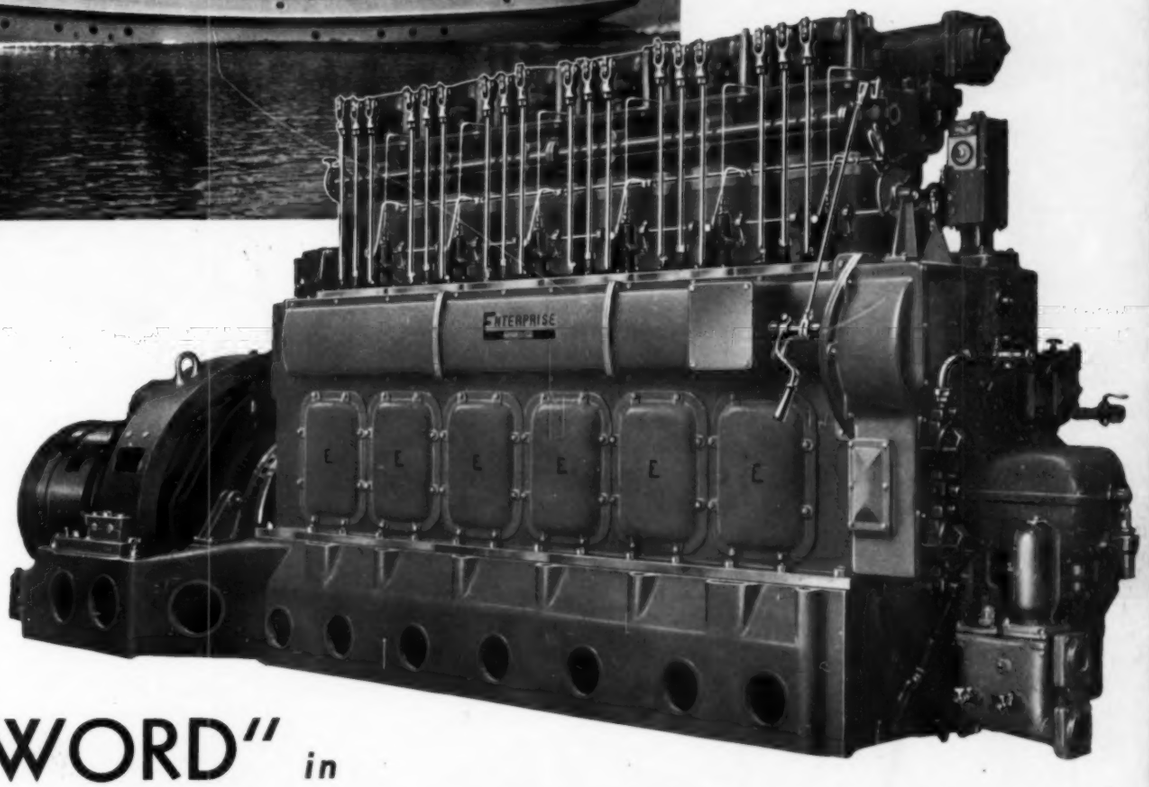
Diesel-electric Survey Boat, ROBERT GRAY, built for the U.S. Engineers and powered by two 360 hp. Enterprise Diesel engines with direct-connected generators.



The

"LAST WORD" in

DIESEL-ELECTRIC Propulsion

HAVING met the exacting specifications of U. S. Army engineers in design, selection of equipment and in performance, the survey boat ROBERT GRAY may rightfully be regarded as the finest craft of its type yet built. Its diesel-electric power equipment, complete in every detail, provides the most desirable characteristics of flexibility, and maneuverability, with utmost economy of operation so essential in the service required.

The Robert Gray is powered by two 360 horsepower, six-cylinder Enterprise diesel engines with direct-connected, single bearing generators and exciters mounted on a common base. As with all Enterprise engines, every detail of design and construction has been developed to assure longest life to all wearing parts, utmost dependability under severe operating conditions, and ease of accessibility and maintenance.

Enterprise Diesel engines for all types of marine application are fully described in our new Bulletin No. 170.

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THE OIL THAT LUBRICATED THE FIRST DIESEL

CHOSEN b BIG

WHEN THE FIRST DIESEL was born, it could not be operated satisfactorily until adequate lubrication had been provided. So the makers of Gargoyle Lubricants—the outstanding lubricants then, as they are now—were called in to work with the inventor . . . and a new oil, the forerunner of Socony-Vacuum's Gargoyle D.T.E. Oils, was developed. With the aid of this lubricant, the economy of the Diesel engine was made available to industry.

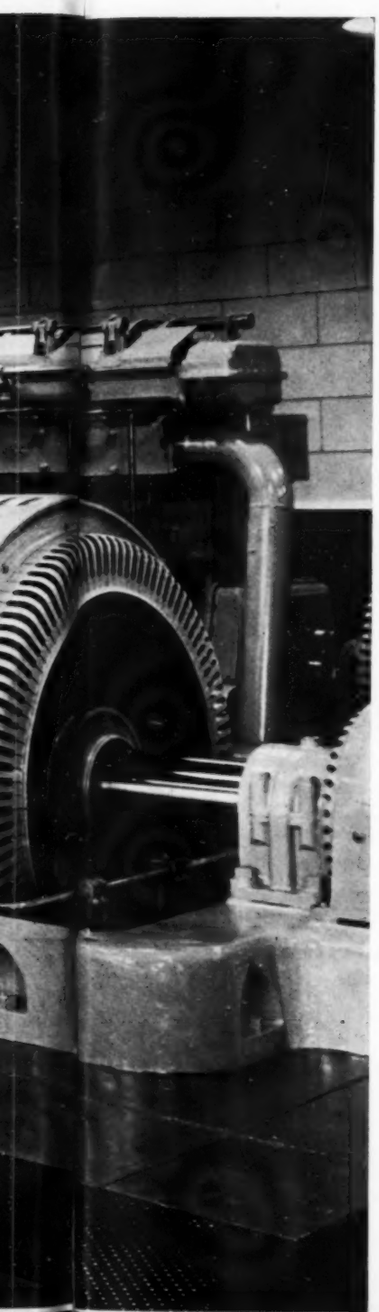
"PROFIT INSURANCE" is important in Diesel operation. That's why Tipton, Indiana, and other shrewd operators buy Gargoyle D.T.E. Oils. These oils are clean after years of constant use . . . cylinder wear is minimized . . . dependable operation is assured . . . economy is greater.

GARGOYLE D.T.E.
Lubricants

SOCONY-V

STANDARD OIL OF NEW YORK
WADHAMS OIL COMPANY · MA

N *by Tipton, Ind., for year's* BIGGEST *Diesel Plant*



Gargoyle D.T.E. Oil Selected On Basis of Superior Quality, Uniformity and Economy In Service

IT IS ESTIMATED that the new Diesel Power Plant at Tipton, Indiana, will save the city approximately $35,000 every year. To make sure that this estimated saving would be realized in dollars and cents, the plant management and personnel carefully weighed every factor having a bearing upon efficient and economical operation.

As the selection of the proper lubricating oils is vitally important to every type of Diesel service, this item was scrutinized most rigorously. Back of their choice of Gargoyle D.T.E. Oils is a type of thinking in regard to lubricating oils from which every Diesel operator in the country can profit.

Here's the way they reasoned at Tipton, Indiana . . . since the makers of Gargoyle Lubricants worked with Dr. Diesel to provide an oil that made the Diesel possible —cooperated with many Diesel builders over the drafting board . . . won the approval and recommendation of 22 of the 26 leading Diesel builders . . . helped thousands of Diesel operators in all fields hang up records for efficiency and economy—Gargoyle D.T.E. Oils were backed up by a knowledge and experience that promised the most satisfactory results . . . protection to a large investment in new equipment . . . long-lived economical efficiency.

The results obtained to date by Tipton, Indiana, and for years by thousands of other Diesel operators, supply definite proof that Gargoyle D.T.E. Oils . . . applied to your operating conditions by skilled engineers . . . usually pay for themselves through savings in maintenance expense and fuel consumption. You will find that it pays to ask the Socony-Vacuum man to work with your men along their lines.

Y-VACUUM OIL COMPANY, INC.

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Not "Just Fuel Oil"

"DSJ-7"

Is A Special Diesel Fuel Oil

DSJ-7 is an extremely efficient, economical and satisfactory fuel oil, viscosity-controlled, sulphur-free and powerful—designed especially for Diesel engines.

Allied Oil Company, Inc., who developed DSJ-7 Diesel fuel oil ten years ago especially for Winton Engine Mfg. Corporation, congratulates that company and the City of Tipton, Indiana, on the new Winton-powered Tipton Municipal Electric Plant which has taken its place among the foremost Diesel-engined municipal plants of the country.

It is logical that these new Winton-Diesel generator units should be operating daily on DSJ-7—just one more instance of endorsement by both the builder and operator of modern Diesel engines. Most engine operators throughout the territory served by Allied Oil Company prefer to purchase a special Diesel fuel from a company dealing exclusively in fuel oil for tank car consumers.

DSJ-7 Diesel Fuel Oil is now available to Ohio, Indiana, and Michigan users.

• • • A DIESEL FUEL OIL FOR YOUR PARTICULAR ENGINE • • •

ALLIED OIL COMPANY

INCORPORATED

Fuel Oil Specialists

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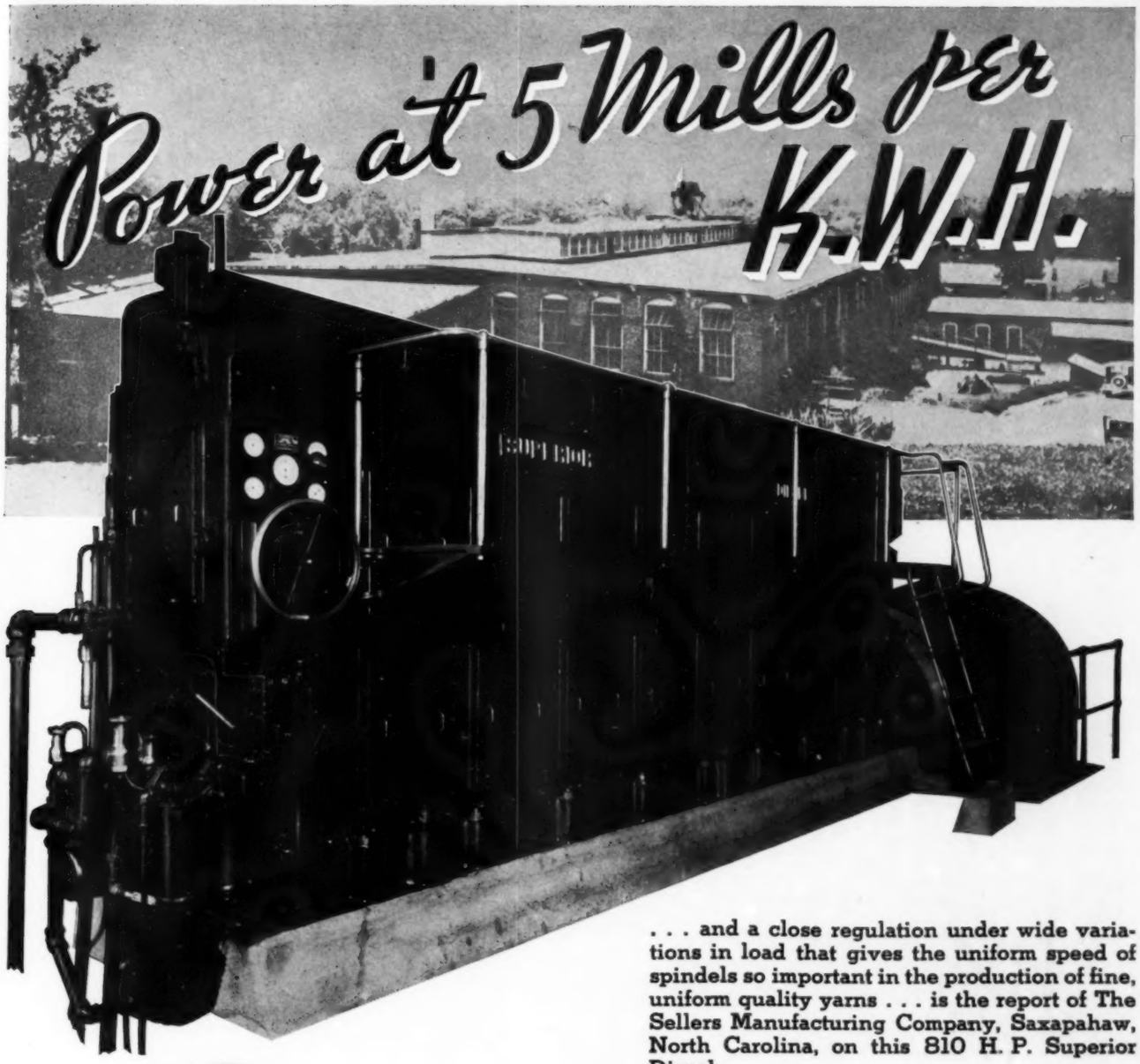
Power at 5 Mills per K.W.H.



. . . and a close regulation under wide variations in load that gives the uniform speed of spindels so important in the production of fine, uniform quality yarns . . . is the report of The Sellers Manufacturing Company, Saxapahaw, North Carolina, on this 810 H. P. Superior Diesel.

This installation is typical of the low power cost and added efficiency that Superior Diesels make possible in every industry.

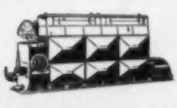
Have you a power problem? A "Superior Power Survey" incurs neither expense nor obligation and is available by writing to Department OPD-133 on your business letterhead.

Superior DIESELS

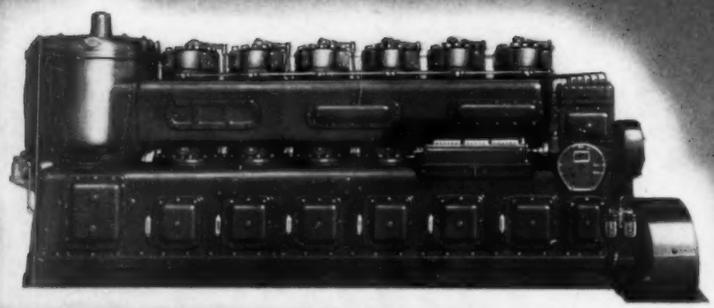
25 to 150 H. P.

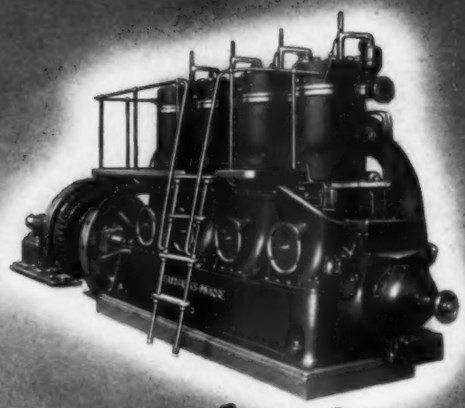
THE
NATIONAL - SUPERIOR
COMPANY
SPRINGFIELD, O. . . . LOS ANGELES, CAL.

50 to 900 H. P.



THE OTTO ENGINE WORKS . . . . PHILADELPHIA, PA.





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FAIRBANKS-MORSE FOR DIESELS

F-M marine Diesels range from compact 10-hp. units for workboat propulsion up to engines for the largest freighters. Auxiliaries supply current for battery charging, drive compressors, or bilge pumps.

F-M stationary Diesels have an even wider range. Power units complete and self-contained deliver 10 to 160 hp. Stationary Diesels in the compact Model 36 type . . . special oil engines, instantly convertible to running with natural gas . . . larger stationary engines for factory and municipal use . . . advanced type opposed-piston Diesels.

When you buy, remember the extra advantages that only a manufacturer with his wide range of types and sizes has to offer. Address Department M81, Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 34 branches at your service throughout the United States.

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106 YEARS OF PRECISION MANUFACTURING

FAIRBANKS-MORSE

Diesel Engines

POWER, PUMPING AND WEIGHING EQUIPMENT

WOODWARD GOVERNORS for DIESELS

A rugged, dependable instrument of high sensitivity, giving the close regulation necessary for manufacturing purposes and accurate time keeping.

Woodward type I C governors as installed in the Municipal Light and Power Plant, Tipton, Indiana.

WOODWARD GOVERNOR CO.

WORLD'S OLDEST AND LARGEST EXCLUSIVE MANUFACTURERS OF HYDRAULIC GOVERNORS FOR PRIME MOVERS

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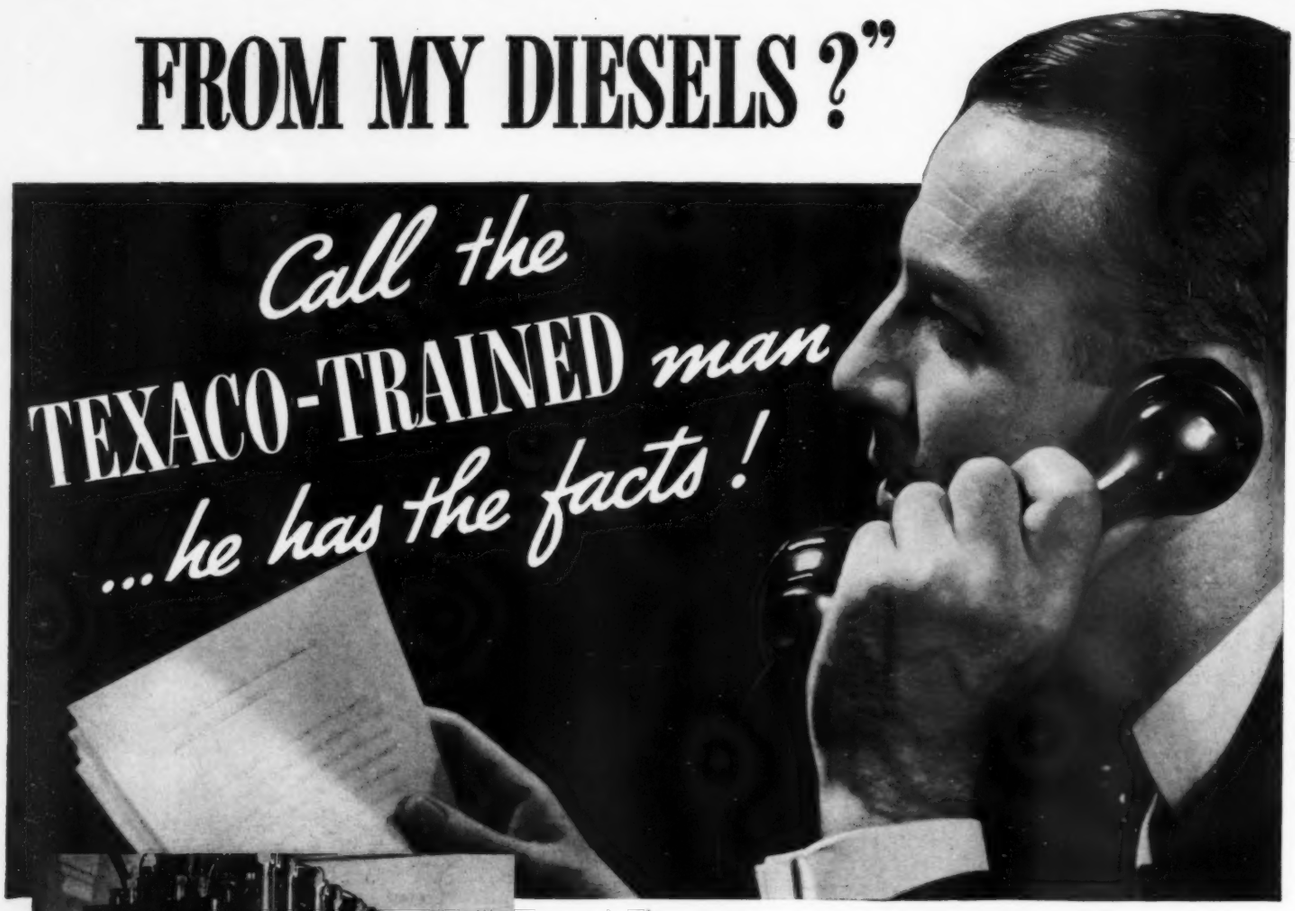
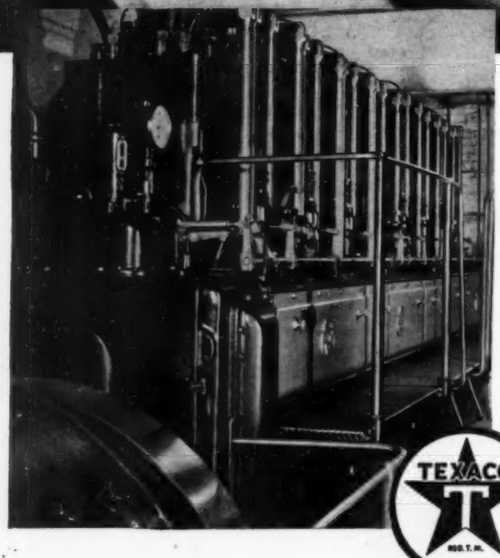
"CAN I GET BETTER PERFORMANCE FROM MY DIESELS?"





WHEN he recommends Texaco Algol or Ursa Oil you are assured of freedom from stuck rings and cylinder liner wear. You get complete piston seal, maximum compression, complete combustion, greater fuel economy . . . because . . .

These oils are made from special crudes. They are especially refined to remove the last traces of harmful carbon and sludge forming elements. They have the toughness and purity possible only in highly refined oils.

A Texaco-Trained representative will be glad to provide practical engineering service to prove the economies of Texaco Algol and Ursa Oils in *your* Diesels.

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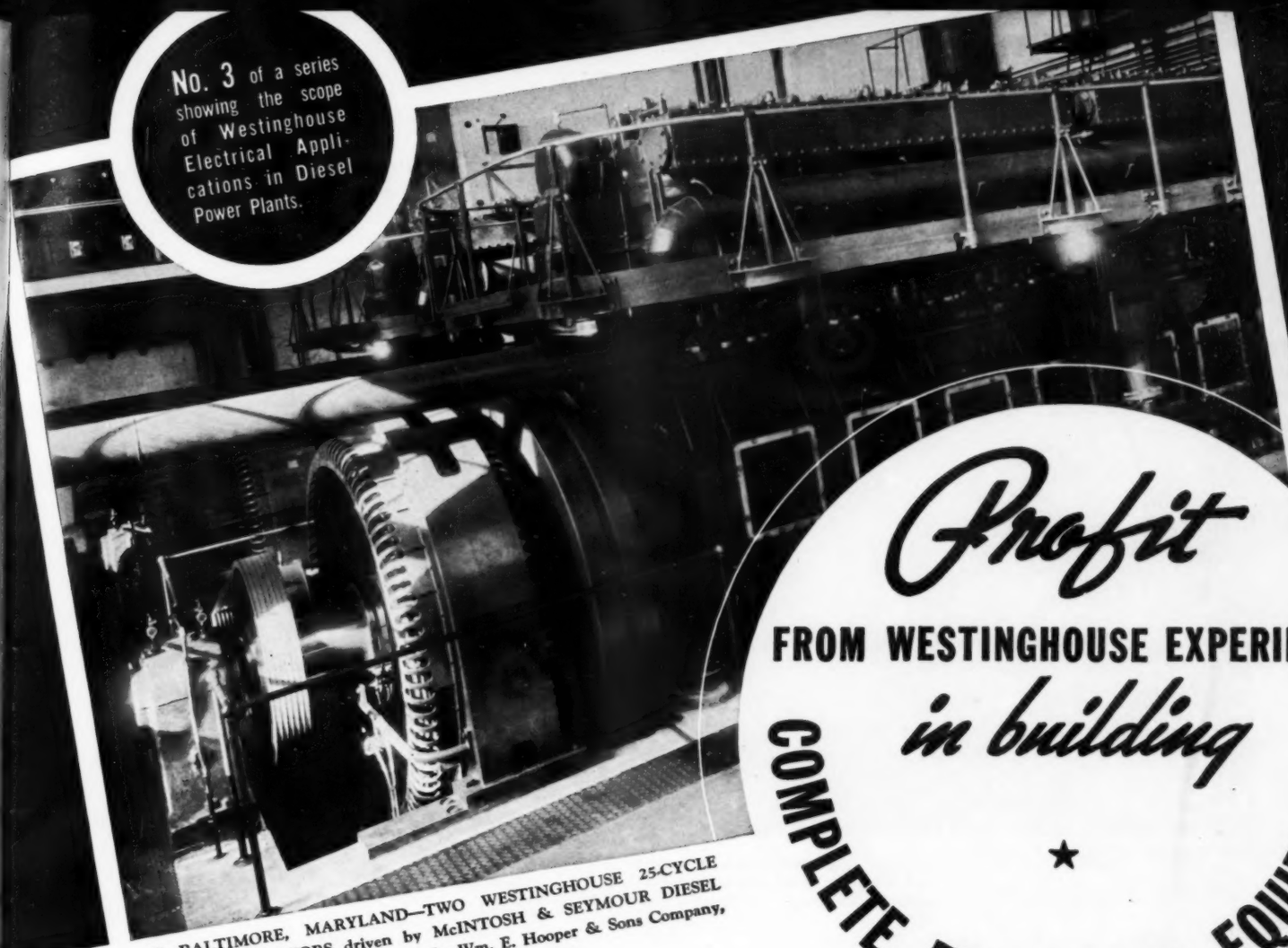
THE TEXAS COMPANY
135 East 42nd St., New York City

Nation-wide distribution facilities assure prompt delivery

TEXACO LUBRICANTS *for all types of DIESELS*

No. 3 of a series showing the scope of Westinghouse Electrical Applications in Diesel Power Plants.



AT BALTIMORE, MARYLAND—TWO WESTINGHOUSE 25-CYCLE ENGINE-GENERATORS driven by McINTOSH & SEYMOUR DIESEL ENGINES . . . in the power plant of the Wm. E. Hooper & Sons Company, manufacturers of cordage, webbing, duck, canvas bags, etc.

Profit FROM WESTINGHOUSE EXPERIENCE *in building* COMPLETE ELECTRICAL EQUIPMENT

★

★ You can insure *a maximum profit* from your Diesel power plant installation by availing yourself of *Westinghouse experience in building a complete line of electrical equipment.*

That experience extends back over 50 years to the early beginnings of the electrical industry. It has proceeded, step by step, as need arose, from one electrical application to another. It has produced combinations of *matched electrical apparatus* for almost every type of complete electrical installation . . . with each piece of apparatus designed and made to perform its proper part in relation to the whole.

In the field of Diesel power, this means generators, exciters, motors, switchboard accessories and other auxiliary equipment adapted specifically to the requirements of Diesel engines . . . to provide the extra dividend which *matched performance* always pays. J 10013

Insist ON WESTINGHOUSE FOR PROFIT

Wherever you are and whatever your specific requirements may be, successful installation experience proves that you can profit by insisting on Westinghouse for everything electrical.

ES GENERATORS—Especially designed for lifetime operation in Diesel Service, with these extra values: *Solid Steel Rotor*, to withstand severest stresses under all conditions. *Protection against Shut-downs*, insured by exclusive high frequency pre-testing. *Positive Ventilation*, for cool running and long life.

EXCITERS—Either direct-connected or belt-driven, as required.

MOTORS—With dual-protected windings, rigid cast frames, and sealed-sleeve bearings . . . for driving compressors and other auxiliaries.

COMPLETE SWITCHBOARD ACCESSORIES—For every requirement: instruments, instrument transformers, relays, switchgear, circuit breakers.

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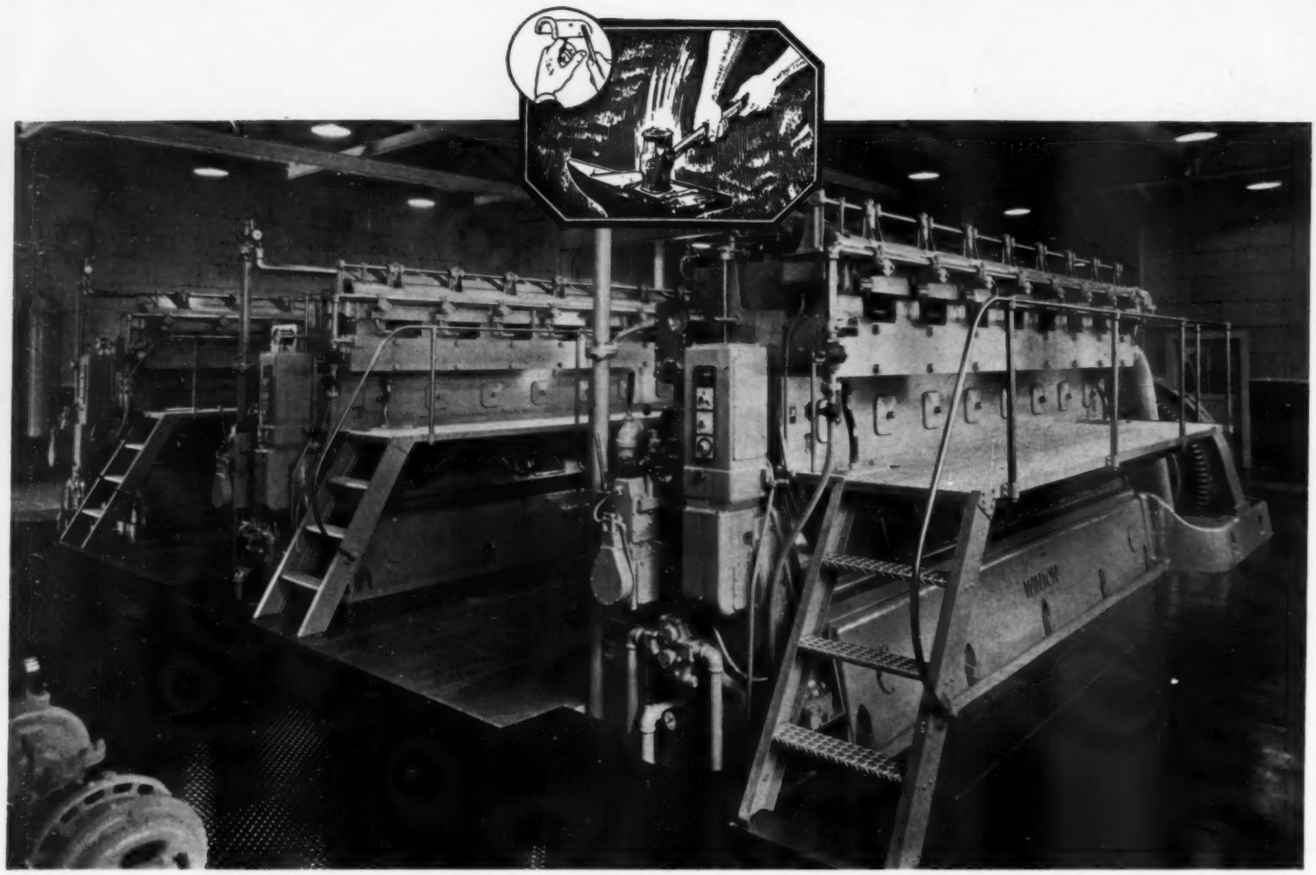
WESTINGHOUSE 1886 W 1936 GOLDEN JUBILEE

ENGINE-DRIVEN GENERATORS AND ELECTRICAL AUXILIARIES



Municipal power plant at Tipton, Indiana, employs three Winton Diesel engines, each of 700 h. p. direct connected to generators and exciters made by Electric Machinery Company. The Diesels are equipped with Satco-lined bearings.

FIXIN' FRICTION . . .

FRICTION rates as power enemy number one with most engineers. Its effect can, of course, be minimized by proper balance and lubrication. Bearing design and composition, too, play a leading role in fixin' friction.

Satco* metal has proved beyond question its ability to "take it" under all sorts of operating conditions. It posesses a low frictional coefficient, a relatively high melting and softening point and extreme toughness and resistance to deformation. These qualities, first demonstrated in the laboratory, have been borne out conclusively by numerous Satco bearing installations around the country. Write for complete information about these jobs.

*A patented alloy manufactured by National Lead Company. Trade-mark registered.

AMERICAN BEARING CORPORATION

Affiliated with National Lead Company

INDIANAPOLIS CENTRIFUGAL American Bearings FORCE **INDIANA**

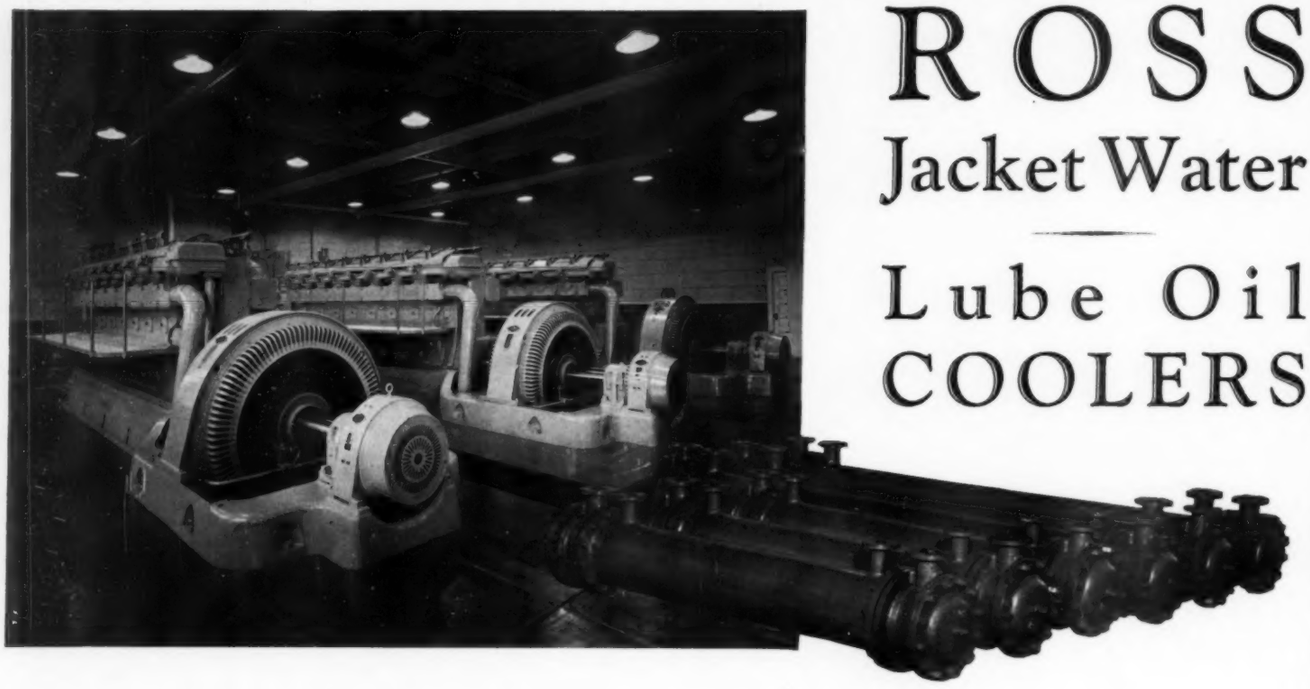
TIPTON · IND.

Erie crankshafts are used in the three 8 cylinder 700 hp. Diesel engines built by Winton Engine Corporation for the Tipton, Indiana, municipal plant.

Because of their superior quality and accurate finish all leading engine builders rely upon ERIE CRANKSHAFTS and other forged parts entering into the construction of stationary and marine engines. Rough and finished connecting rods, piston rods, crossheads, generator and extension shafts. Complete facilities for prompt delivery on all major forged or cast steel elements required in the building and powering of every type of construction.

ERIE FORGE COMPANY

ERIE, PENNSYLVANIA



ROSS
Jacket Water
Lube Oil
COOLERS

Tipton, Indiana

Ross Coolers selected by the Winton Engine Corp. for the new municipal power plant at Tipton, Indiana

FOR the past twenty years Ross Engineers have been leaders in the design and construction of all types of heat exchangers, oil and liquid coolers.

Recently a new improved design has been perfected which is particularly adapted for cooling lube oil and jacket water of Diesel engines of all types. They are compact, light in weight, carefully designed, and reliable in performance.

The selection of Ross coolers by the Winton Engine Corp. for both lube oil and jacket water cooling at the new municipal power plant at Tipton, Indiana, as well as numerous other installations is evidence of the suitability of these exchangers for this service.

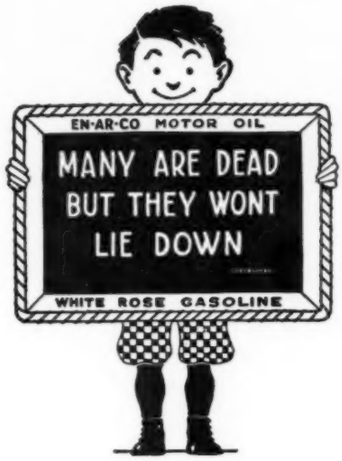
Sales representatives in all principal cities will gladly discuss and make recommendations on jacket water coolers and lube oil coolers with Diesel manufacturers and operators for both old and new installations.

ROSS HEATER & MFG. CO., INC.

Division of American Radiator and Standard Sanitary Corp.

NEW YORK, N. Y. BUFFALO, N. Y. CHICAGO, ILL.

NOT CHEAP — *but* ECONOMICAL!



At the Sign of the
BOY AND SLATE
there is an En-ar-co Lubricant
for every requirement

EN-AR-CO DIESEL OILS
EN-AR-CO MOTOR OIL
EN-AR-CO PENN MOTOR OIL
EN-AR-CO GEAR LUBRICANT
EN-AR-CO CHASSIS LUBRICANT
and other En-ar-co
INDUSTRIAL *and* AUTOMOTIVE
LUBRICANTS

There's a difference and, in lubricants, so often it can't be detected by the eye. Only actual use in expensive equipment will prove it and then it's visible —very visible—on your cost sheets!

EN-AR-CO Diesel OILS
are not CHEAP-*they're* ECONOMICAL!

Hour after hour, day after day and month after month of service in the crank case of your Diesels will prove to you that the superior lubricating qualities and longer life of En-ar-co Diesel Oils, the reduction of maintenance and upkeep costs—no idle hours due to lubrication failure—mean a very real operating economy.

More than half a century of experience in refining quality lubricants is back of En-ar-co Diesel Oils. They are made for Diesel engines under the supervision and direction of engineers who KNOW Diesel engines and who know how costly it is to take chances with any lubricant other than the best.

Give En-ar-co Diesel Oils a trial in your equipment and you too will be convinced that, regardless of how well satisfied you may be at present, there IS such a thing as FURTHER ECONOMY—EN-AR-CO ECONOMY!

THE NATIONAL REFINING CO.
HANNA BLDG., CLEVELAND, OHIO

WINTON SCORES AGAIN

The new Municipal Light and Power Plant at Tipton, Indiana, is a fine example of that economy and efficiency developed by the use of Diesel Engines.

Three 8-cylinder 700 H. P. Diesel Engines, directly connected by two three-phase cycle Generators, furnish the answer to a modern need.

And it's natural enough that Winton Engineers have selected the Purolator Oil Filter to protect their oil from the dirt and grit and hard carbon that inevitably settle in every engine.

Our Filter Engineers invite your inquiries on any matter that has to do with the effectiveness of either lube or fuel oil. Motor Improvements, Inc., Newark, New Jersey, makers of

PUROLATOR

The Oil Filter

VIBRATION
TRACTOR ENEMY NO.1

It is a universal law that marching soldiers must break step while crossing a bridge — to avoid the destructive effects of VIBRATION. Unless *controlled*—vibration can be just as destructive in tractors.

CONTROL MAKES THE DIFFERENCE

CONTROL MEANS *longer life*

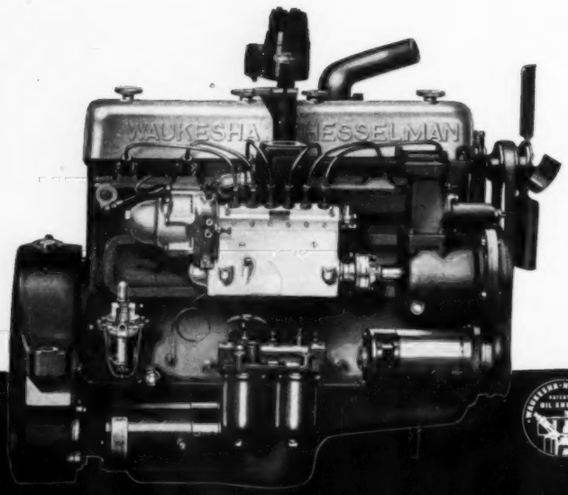
★ CONTROLLED *Instant* STARTING
CONTROLLED INJECTION OF FUEL
CONTROLLED AIR-FUEL RATIO
CONTROLLED IGNITION

14 TO 21 HOURS PER DAY. In the construction of a new two-lane highway on U. S. 30 across northern Indiana, the Controlled Ignition Oil Tractors of J. C. O'Connor work 14 to 21 hours a day. Above is one of the Model "L-O's" with 7-yard Continental Scraper. Below is a Model "K-O" leveling the grade.

It is only natural that Controlled Ignition, with its low compression pressures and freedom from destructive vibrations, should man longer tractor life. A typical owner reported that after 7,000 hours of heavy work — in severe dust, 22 hours a day — he had not even replaced the original sleeves and pistons of his first Model "K-O." In a large logging camp — under the most abusive type of work — a fleet of Model "L-O's" worked 3,500 hours and still had their original pistons, sleeves, rings, valves, steering clutches, master clutches, brake bands, main and connecting rod bearings.

Control makes the difference! Controlled Ignition enables Allis-Chalmers Oil Tractors to burn any good grade of low cost Diesel fuel oil . . . without excessive stress and strain on metals and working parts. There is no need for heavy, unbalanced construction, special high pressure bearings, high tension rings, heat reservoirs in the combustion chamber or special lubricating oil. Investigate this IMPROVED method of burning low cost Diesel fuel.

ALLIS-CHALMERS *Controlled Ignition* **OIL TRACTORS**
TRACTOR DIVISION—MILWAUKEE, U. S. A.



THE WAUKESHA-HESSELMAN

...an oil engine with these unique SALES ADVANTAGES

In any product you engineers design—the sales advantages of that product are of first importance.

Building your product around a Waukesha-Hesselman Oil Engine makes it much easier to sell.

Hesselman Engines are low pressure engines. That means longer lived engines...longer lived transmissions, axles and other component parts.

Hesselman Engines are the same size and weight, and fit in the same mountings as gasoline engines of equivalent power and speed. This means economical shop production...the same chassis may be powered with an economical oil engine, without major changes. Engines may be switched on the loading platform if necessary.

Waukesha-Hesselman Oil Engines range in size from 20 hp. to 300 hp., both four and six cylinders. It will pay you to get full details. *Write* for Bulletin 1000. *Waukesha Motor Company, Waukesha, Wisconsin.*

WAUKESHA ENGINES

DIESEL PROGRESS

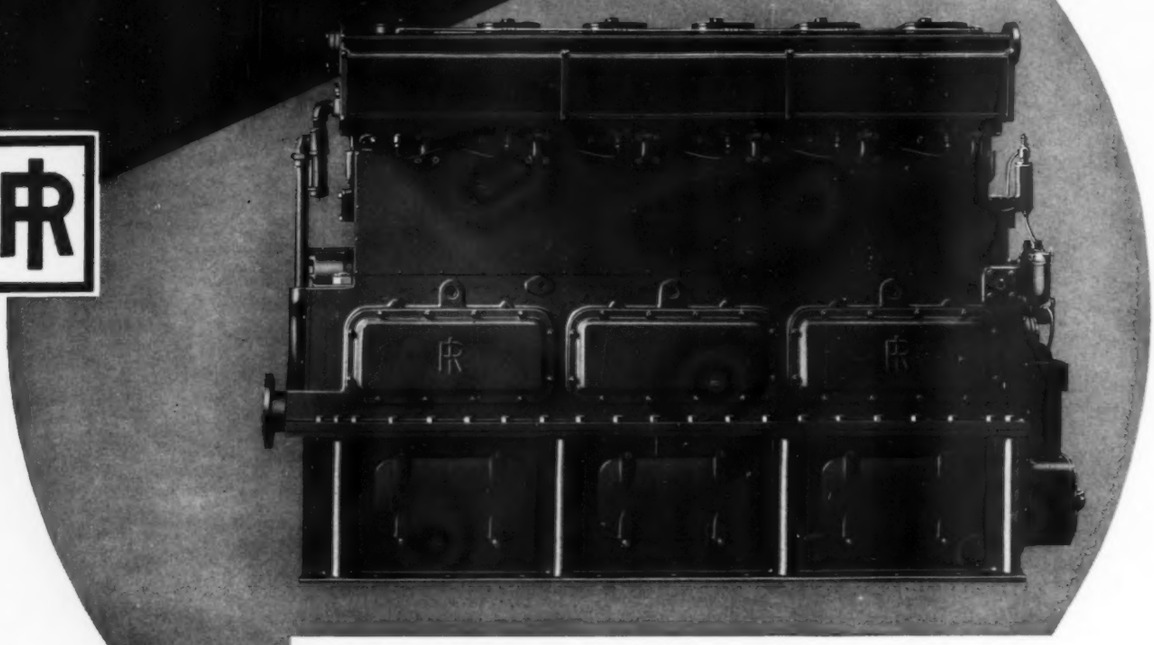
CONTENTS for OCTOBER

FRONT COVER ILLUSTRATION — A powerful Caterpillar Diesel tractor uses its winch effectively in salvaging logs from the bottom of a canyon — Tioga road construction, Yosemite National Park.

TABLE OF CONTENTS ILLUSTRATION — Photograph by Morris Rosenfeld. The *Marie S. Moran*, first Diesel tug to join the famous fleet bearing that name. Her principle dimensions are: 89'x22'x9'3". Her 550 hp. Winton Diesel brought her 2,185 miles in 236 hours through near hurricane weather on the open sea.

Subscription rates: U.S.A. and Pan American Countries $3.00 per year; 25c per copy. Canada and all other countries, $5.00 per year; 50c per copy.

The MODERN DIESEL Type "S"



A few of the many advantages of Type S Diesels:

1. MODERN DESIGN
2. LOWER FUEL CONSUMPTION
3. LOWER INSTALLATION COSTS
4. MORE EFFICIENT POWER TRANSMISSION
5. INEXPENSIVE TO MAINTAIN
6. A THOROUGHLY PROVED ENGINE

MODERN DESIGN

- FULLY ENCLOSED MODERN DESIGN
- WELL BALANCED CONSTRUCTION
- EASILY ACCESSIBLE WORKING PARTS

THE Ingersoll-Rand Type S Diesel engine is an improved unit which is thoroughly modern in all respects. The fundamental design is similar to that of the successful I-R locomotive engine of which there are more than 140 in operation. Some of these have been in service for over 12 years.

The new Type S is the culmination of a vast amount of research and experience gained during 16 years of building outstanding solid-injection Diesels. Some of the modern features of its design are: full enclosure of the engine, cylinder liners, balanced construction throughout, lower weight, and high-speed performance without sacrifice of long life and reliability.

Type S engines are made with 3, 4, 5, 6 and 8 cylinders for ratings from 150 to 460 hp. Get in touch with our nearest branch office today and ask to have one of our engineers tell you more about this engine. Write for Bulletin 10010.

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DIESEL PROGRESS

REX W. WADMAN, Editor and Publisher

PORT WASHINGTON, LONG ISLAND, September 10th, 1936. Just as dusk was falling here tonight a flying boat came out of the East, glided to a landing on beautiful Manhasset Bay and was promptly taken in charge by the capable officials and equipment of Pan-American Airways, who maintain a modern seaplane base here.

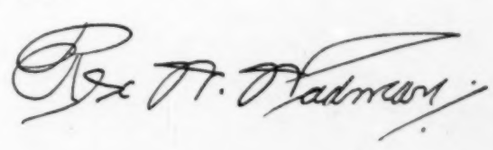
That flying boat was the *Zephir,* a ten ton Dornier monoplane, owned and operated by Deutsche Lufthansa of Germany, manned by four Germans and powered with a pair of 550 hp. Junkers "Jumo" 205-C Diesel Engines. The *Zephir* has just completed a non-stop flight of 2,390 miles from the Azores to this quiet harbor in exactly 22 hours and 14 minutes.

Only a small crowd here, a very small crowd. Lots of cameras, microphones, flash lights, etc., but a small crowd, despite the fact that this is an epochal flight. The first East-West flight of any plane from the Azores but, most interesting of all, the first flight of any heavier than air Diesel powered airplane across the North Atlantic.

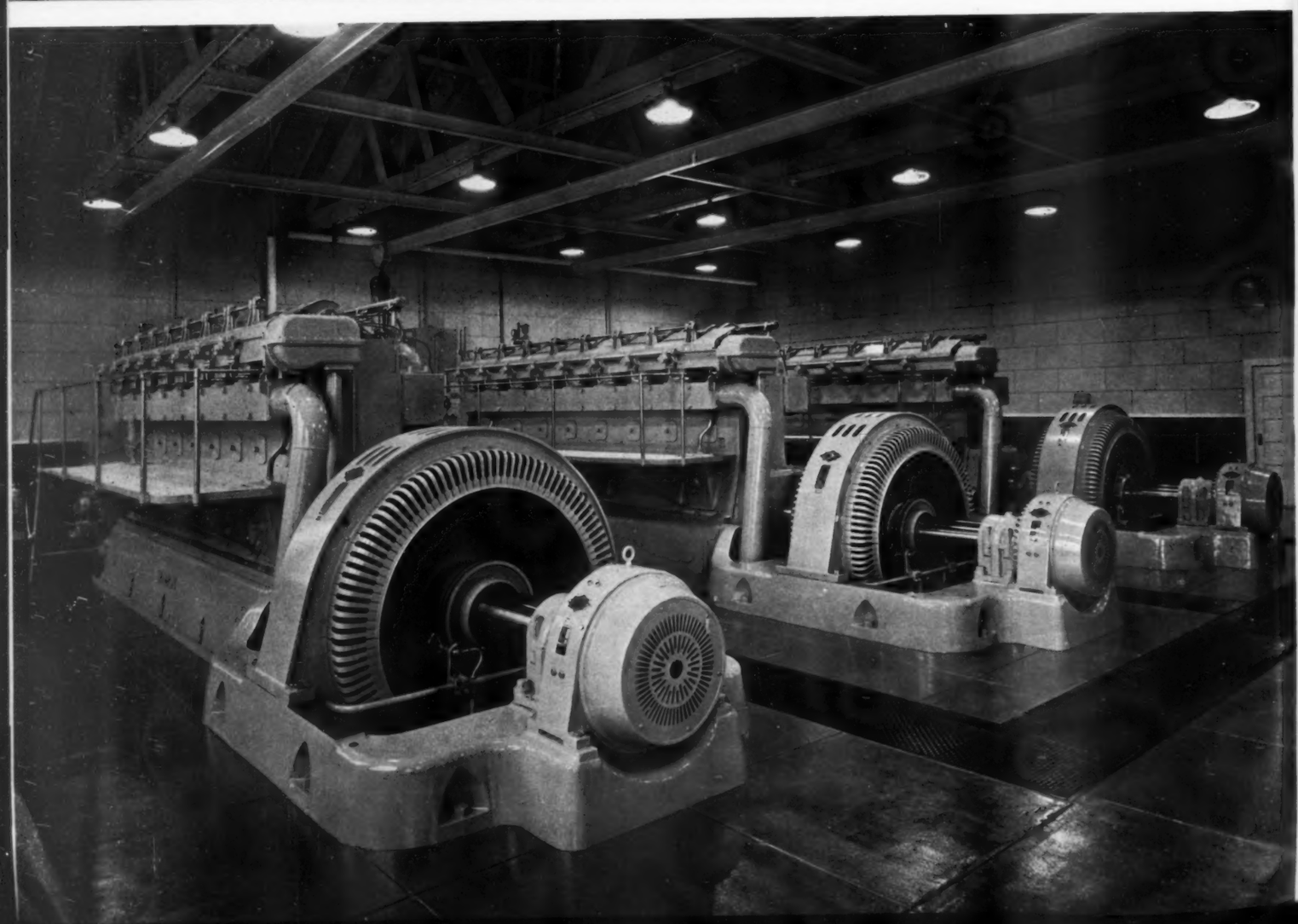
Just an efficient piece of pioneering work, without any undue ballyhoo or fuss. Deutsche Lufthansa wanted to know if a seaplane, catapulted from a Mother-ship (Diesel powered by the way) off the Azores could successfully make a trip to the United States in reasonable time and with a reasonable fuel cost. They've proved their point right here tonight, it can be done, it has been done.

As this is written the Zeppelin *Hindenburg* is preparing for her eighth commercial flight to the United States, before leaving Germany she is to increase her passenger capacity from 50 to 72. The *Hindenburg's* Diesel engines have proven their dependability, their efficiency, their economy, just as the Diesels in the Lufthansa planes have done.

In this issue appears the twelfth consecutive article on the application of Diesel engines to aviation. With the capable assistance of Paul H. Wilkinson, our aviation editor, we have carried the gospel far and wide through this country of ours that the rest of the world is successfully adapting the highly efficient Diesel engine to aviation—but what are we doing about it over here?




TIPTON ELECTRIC LIGHT CO



TIPTON, INDIANA

By WARREN C. BEVINGTON

WARREN C. BEVINGTON
Bevington-Williams, Inc.
Consulting Engineers

THE completion of the new municipal electric generating plant by the City of Tipton, Indiana, has created wide spread interest, as it exemplifies the modern trend in municipal electric generating plants.

The City of Tipton, Indiana, has a population of approximately five thousand and is the county seat of Tipton County, located in central Indiana. The City lies in a rich farming country which is especially adapted to raising products for the canning industry. This industry employs hundreds of people during its season from July to October.

In addition to its agricultural advantages the City contains manufacturing plants of a diversified nature, including manufacture of piston rings, supplies for the poultry industry, high grade furniture and other smaller specialized lines.

The completion of the new plant is not the first venture of the City in municipal ownership, as a steam electric generating plant was owned and operated by the City prior to 1923, together with the distribution system. In 1923 the steam plant was closed and current was purchased from a private utility under a gateway contract and was distributed by the City over its own distribution system, which covers the City and the major part of the county.

Generator view of the Tipton Municipal Diesel Power Plant, showing E.C.M. Generators with direct connected exciters and the three 700 hp. 360 rpm. Winton Diesels.

During this period the City has maintained an operating force consisting of a superintendent, service men and a bookkeeping force, as the current was purchased wholesale and the distribution of the current and collection of bills was handled by the City.

A municipal water works is also operated in connection with the electric power plant. The waterworks is entirely electrically operated and has a peak capacity of approximately two million gallons daily.

During the period that current was purchased from a private utility the question of rehabilitating the municipal plant was debated by the citizens and in 1933 the City of Tipton retained the engineering firm of Bevington-Williams, Inc., of Indianapolis, Indiana, to investigate the possibilities of setting up equipment for generating electric current.

Various studies and reports of plant operation were made by the Engineers to the City, and the City Officials also conducted an investigation of the various types of municipal generating plants. The study and investigation resulted in a determination on the part of the City to proceed with the rehabilitation of the generating plant, and on February 15, 1935, a contract was awarded to the Winton Engine Corporation of Cleveland, Ohio, for three 700 hp. Diesel engines with direct connected generators, switchboard and other necessary appurtenances to make a complete electric generating plant.

This plant was installed in the old power house building which is approximately 40 years old. The structure was entirely overhauled and modernized; the interior of it being refinished with acoustical material known as Johns-Mansville bevel board. This material gives a very clean cut pleasing effect and quiets the noises of the engine room.

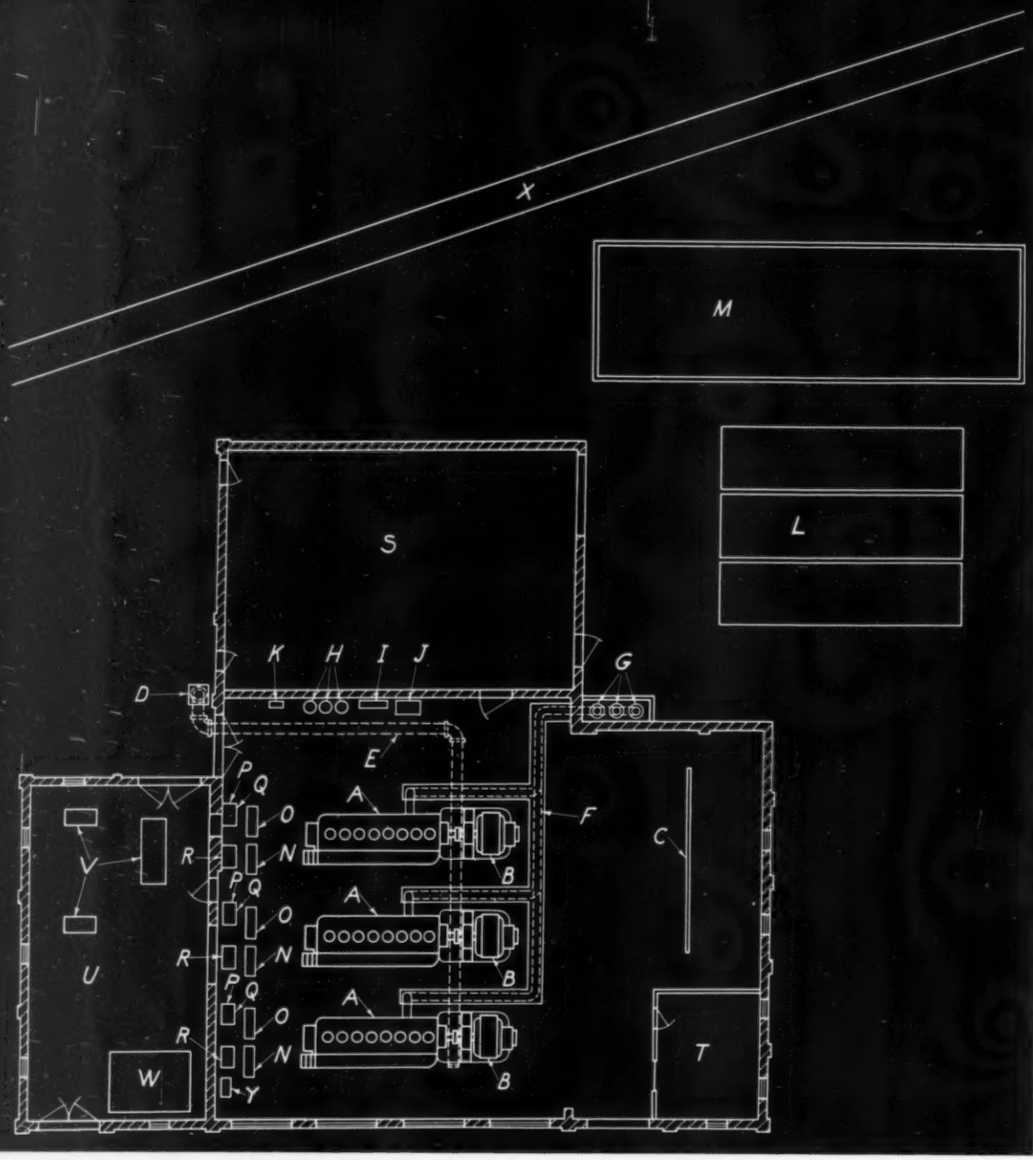
G. M. WILLIAMS
Bevington-Williams, Inc.
Consulting Engineers

The plant consists generally of three (3) 700 hp. Winton Diesel engines, direct connected to E.C.M. alternating current generators, generating 2,400-volt, 3-phase, 60-cycle current. The switchboard is a manually operated remote control board of latest design containing the necessary generator and exciter panels together with the circuit panels for street lighting, power for industries and general illumination of the City.

The switchboard also contains a panel fitted with a Telechron clock from which the frequency of the current is regulated. A Western Union clock is also installed for regulation of the Telechron clock. In this manner it is possible to operate electric clocks on correct time from the current generated by the plant.

Due to the water being hard and unfit for direct cooling, the engines were provided with an indirect system of cooling using the raw water as a cooling medium through shell and tube type heat exchangers of Ross manufacture. The pure water is circulated through the engines and exchangers; there being a 200-gallon expansion tank provided.

Each engine has its individual cooling system



Legend

A. Eight-cylinder 700 hp. 360 rpm. Winton Diesel engine
B. 485 kw. E.C.M. generator with exciter
C. Switchboard
D. Coppus air intake filter
E. Air intake pipe
F. Exhaust pipes
G. Burgess exhaust mufflers
H. Starting air receivers
I. Motor driven Gardner Denver starting air compressor.
J. Gasoline engine driven Gardner Denver starting air compressor
K. Viking fuel transfer pump — 25 gpm. at 25 ft. head
L. Underground fuel oil storage tanks — 13,500 gallons each
M. Binks cooling tower
N. Jacket cooling water wall tank
O. Ross lubricating oil cooler
P. 200 gallon jacket cooling water wall tank
Q. 200 gallon lubricating oil tank
R. 200 gallon fuel oil day tank
S. Existing boiler room
T. Superintendent's office
U. Water works department
V. Water pumps
W. Air compressors
X. Railroad siding
Y. DeLaval lubricating oil centrifugal purifier

consisting of the heat exchanger and oil cooler which are of the shell and tube type of Ross manufacture having its own raw and soft water pumps.

The temperature of the discharge water from the engine is controlled by Taylor thermostatic valves on the raw water side of the heat exchanger.

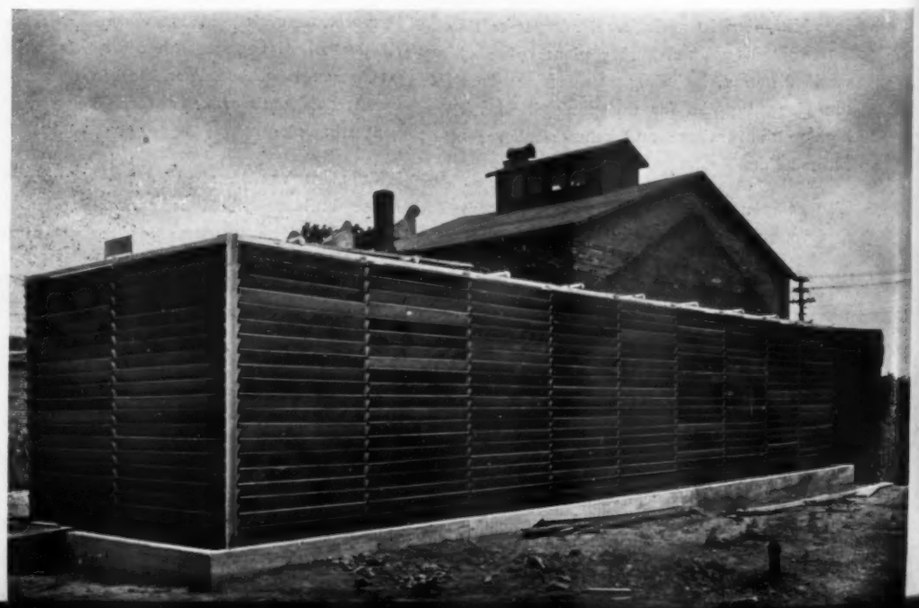
The quantity of water which circulates around the engine is not varied. The raw water side of the exchanger is automatically controlled to give uniform temperature of jacket water from the engine throughout its range of load.

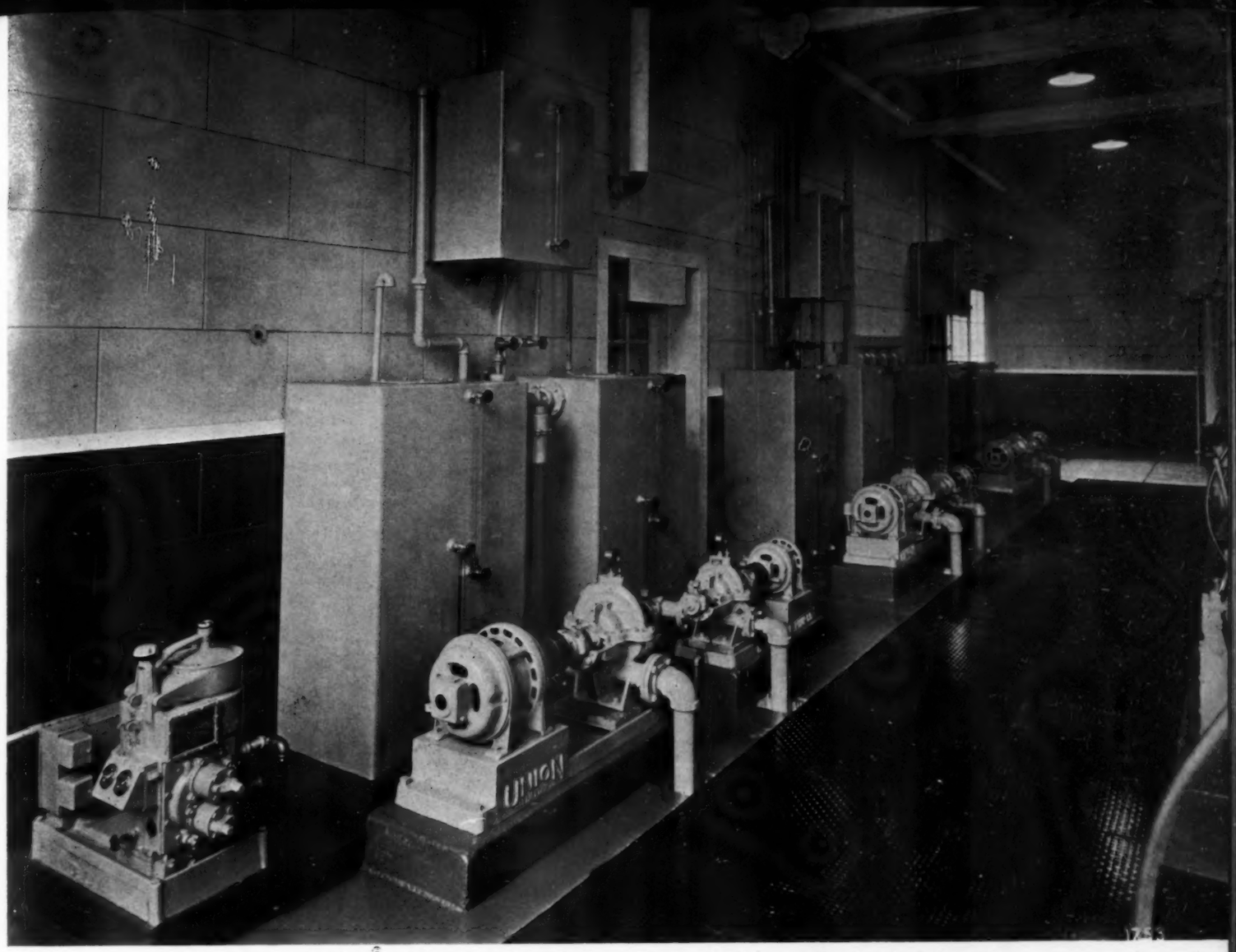
The small amount of make up water required for the circulating system is provided by a Permutit softener which feeds direct by manual control to either of the three circulating systems.

The raw water bypasses from the exchangers over a Binks spray type cooling tower having a capacity of 1,000 gpm. The raw water circulating pumps, manufactured by the Union Steam Pump Company, are double suction, ball bearing type pumps having a capacity of 300 gpm. The soft water pumps are of the same type and manufacture and have a capacity of 150 gpm.

The lubricating system of the engine, of course,

Binks 1,000 gpm. spray type Cooling Tower.





DeLaval Centrifugal Purifier in foreground with pumps, lube oil and fuel oil day tanks, etc., in background.

follows along Winton usual lines. The engine is of the force feed dry crankcase type; the oil from the engine being taken by an oil pump from the crankcase of the engine. It is first taken through a strainer of the screen type and forced through a Purolator filter which is in duplex and taken over to a 200-gallon lubricating oil tank. The oil is taken back from the lubricating oil tank by a second oil pump integral with the engine and is then forced through a Ross lubricating oil cooler through another screen type strainer to the bearings of the engine. The entire capacity of the lubricating oil pump at all times passes through the oil coolers; the surplus oil being bypassed to a spring loaded valve back to the suction line of the first oil pump. This particular feature has the effect of balancing the work done by both of the lubricating oil pumps and also keeps the maximum velocity of lubricating oil through the cooler. A DeLaval Centrifuge is provided to centrifuge the lubricating oil either continuously or by batches at the will of the operator.

The engines are equipped with Woodward hydraulic governors, electrically controlled, for synchronizing and with adjustable characteristics. The governing is unusually close as will be noted by the accuracy of time which does not exceed five seconds plus or minus in 24 hours operation.

Gardner Denver Air Compressors.

Looking from the switchboard towards the front of the building.

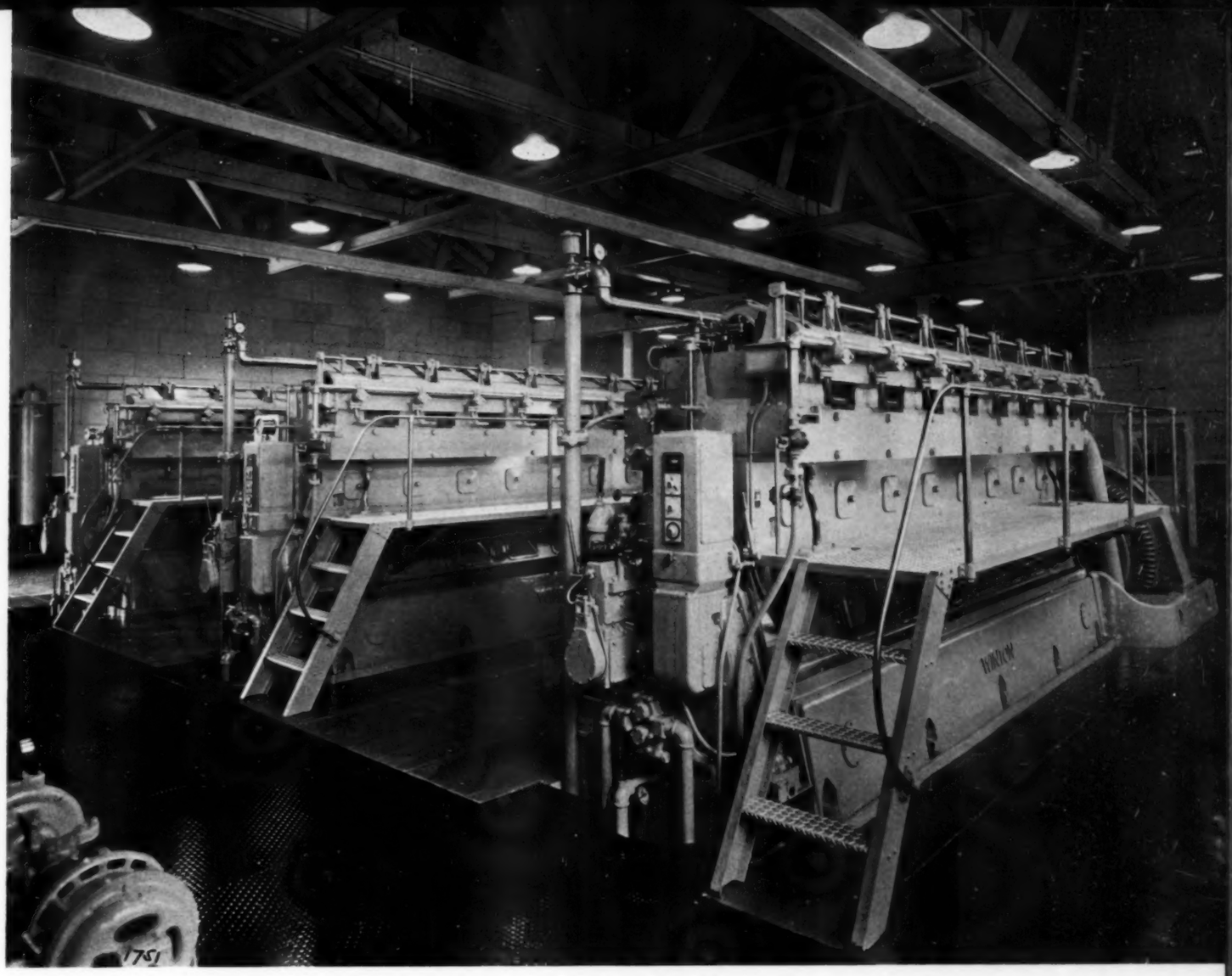
The fuel oil for the operation of the plant is stored in underground storage tanks located adjacent to the switch track and having capacity of approximately forty-thousand gallons; the fuel oil being unloaded by gravity directly from the tank cars to the underground storage and pumped by Viking transfer pumps from the underground storage tanks to day tanks located in the engine room.

The plant was put in operation on August 1, 1936, and shows a day peak load of approximately 900 kw. and a night load of approximately 400 kw. Two engines are operated on the day load and one engine is operated for the night load. The proportionate size of the generators to the electric demand makes a nicely balanced plant and an economical operating condition insuring efficient operation. Under the present load conditions one engine is held in reserve for emergency purposes.

The plant is operated under a normal engine load factor of 57 to 60 per cent and delivers 11.75 kwh. per gallon of fuel gross. The net kilowatt hours delivered on the line after deducting the power consumed for auxiliaries, station lighting, etc., is 11.2 kwh. per gallon of fuel. The lubricating consumption is very low as is typical of Winton engines, approximating 10,000 hp. hours per gallon.

It is estimated that this plant will save approximately $35,000.00 per annum over purchased

Switchboard built by Electric Machinery & Mfg. Company.



Operating end of the engines showing Woodward Governor.

power and, when figuring it against steam cost, the saving would be almost double this amount. It is very interesting also to note that this plant, in savings alone, will pay for itself and interest on unpaid balances in ten years and will leave more than $100,000.00 in the City Treasury. Based on 1935 operation, this plant will generate more than 1,250,000 kwh., in round figures, per annum.

The service given by the plant has been most excellent, there being no interruptions, exceedingly close frequency and voltage regulation and, as a whole, promises not only most excellent operation but a very profitable property for the City.

The territory served by the plant consists of the City of Tipton, together with rural communities in the County. The entire distribution system both in the City and County is the property of the Tipton Light and Water Plant.

Complete operating records are being kept including kilowatts generated, fuel oil consumed, lubricating oil, and the amount of current consumed by plant auxiliaries, likewise the amount of current transmitted over the distribution system. This latter item is running about 14,000 kw. per day. The records obtained from operating the plant will be available to interested people and can be obtained by application to the City of Tipton, Indiana.

The City is planning a formal dedication of the plant in the near future and is preparing to entertain many visitors including officials from other cities who are interested in municipal electric plant operation.

The citizens of Tipton can be justly proud of the achievement of this plant.

Editor's note — About three weeks after this splendid plant went on the line it was the editor's privilege to visit Tipton, watch the installation in operation, call on some of the leading industries served by the plant, check the operating load, frequency control, etc., and examine in detail the completeness of the whole set-up, see just how each engineering detail had been worked out successfully and efficiently.

A great deal of credit is due the Consulting Engineers, Bevington-Williams, Inc., and to Mr. Merrill P. Wolfe and his associates in the Winton organization. Mr. Wolfe, as industrial sales manager for Winton, has a number of outstanding installations to his credit, such as the Singer Tower in New York; Ohio Wax Paper plant in Columbus, Ohio; the Great Lakes Pipe Line pumping stations, etc., but Tipton is the last word in a clean cut, well engineered municipal Diesel power plant.

DACEMA

ANOTHER experienced yachtsman specifies Diesels. The new, twin-screw, Dawn 50-ft. cruiser recently delivered to Mr. George G. Milne at the American Yacht Club, Rye, New York, is powered with two Buda Diesels.

While Mr. Milne has always been keenly interested in sailing and yacht racing, he is perhaps best known for the enviable record he established as owner and skipper of the 10-meter sloop *Branta*, one of a class of fourteen which enjoyed extremely keen competition in Long Island Sound and cruising races. As a tender for his racing sloop, Mr. Milne used a 50-ft. gasoline day-cruiser. After the 10-meter class broke up several years ago and the various boats became separated through re-sale, the *Branta* also changed hands, leaving the cruiser with no races to convoy and with inadequate accommodations for extended cruising. In addition to these reasons for wanting a new power yacht, Mr. Milne was keenly aware of the fire and explosion hazard attendant to gasoline engine operation and, being a retired engineer, he was quick to appreciate the safety of Diesels perhaps even more than their well known economy. Thus it was not surprising that when Dawn Cruisers, Inc., were commissioned to build *Dacema*, the Buda Company received the order for powering her.

They supplied two six-cylinder, marine type Diesels with a bore of 4½ inches and a stroke of 5½ inches, delivering 90 hp. at 1,600 rpm. and 110 hp. at 2,000. These drive wheels of 26 inches diameter and pitch through Morse gears with a reduction ratio of two to one. Exide batteries provide power for starting and lighting and a Homelite auxiliary generating set is also installed for charging in case of protracted lay-overs in port without running the main engines. By lining the under side of the engine compartment with Johns-Manville Acoustical Tile, operating sound has been reduced to a negligible minimum. Likewise, vibration, exhaust odor and smoke are conspicuous by their absence.

Outwardly, *Dacema* is conventional in appearance with the pleasing lines of the standard Dawn design. Inboard, however, many changes have been incorporated, following the specific ideas of her owner. Both Mr. and Mrs. Milne have sailed extensively and, consequently, were able to make many valuable suggestions regarding interior disposition of space. While sleeping accommodations for a maximum of eight persons (including crew) are provided, at no point on the boat is there the slightest suggestion of crowding despite the fact that the master stateroom adjoins an unusually spacious toilet with hot and cold shower-bath. This cabin is also provided with two large wardrobes, ample shelves, racks and lockers and a distinct innovation in the form of a combination dressing table and writing desk. The customary drop-leaf table is well omitted between the berths, since plenty of space is

Left: The new Dawn 50 ft. Diesel cruiser under way during the recent New York Yacht Club cruise.

"Dacema's" main saloon, master cabin and twin Buda Diesels.

available for folding tables either on the after deck or in the saloon amidships. The latter is generally used for dining, since it is only four steps down and forward to the galley. The illustrations convey much more clearly than words how comfortable and homelike is this saloon.

Dacema's galley design will contribute much to the pleasure and good tempers of those who are concerned with food whether it is preparing a meal or seeking a late snack. There is ample headroom throughout with plenty of leeway for elbows thrown in for good measure, despite the installation of a three-burner gas range and a General Electric refrigerator. An abundance of light and ventilation complete the picture. And so it goes from stem to stern. Careful planning, thorough workmanship, high grade materials and safe, economical Diesel engines combine to make *Dacema* a fine, comfortable and seaworthy cruiser.

General view of the Sellers Manufacturing Company's plant in Saxapahaw, North Carolina, where the new 810 hp. Superior Diesel has been installed.

20,000 SPINDLE DIESEL YARN MILL

THE original plant of the Sellers Manufacturing Company was built in 1846. Thus, the history of this plant dates back to the early days of the development of the textile industry in the United States. It is located on the banks of the Haw River in Saxapahaw, Alamance County, North Carolina, and is 13 miles from Burlington, North Carolina, center of the rayon weaving and hosiery manufacturing industries, both of which industries have contributed so largely to the industrial development of the South.

The mill first engaged in the manufacture of cotton cloth and a simple water wheel supplied ample power for the then small output. In 1890, new cotton spinning and weaving machinery was added and again in 1907 the manufacturing capacity of the mill was doubled. With this large expansion came the need for more power and a more uniform power supply than could be expected from the veteran water wheel, and a Corliss steam engine generating set was installed and the mill completely electrified.

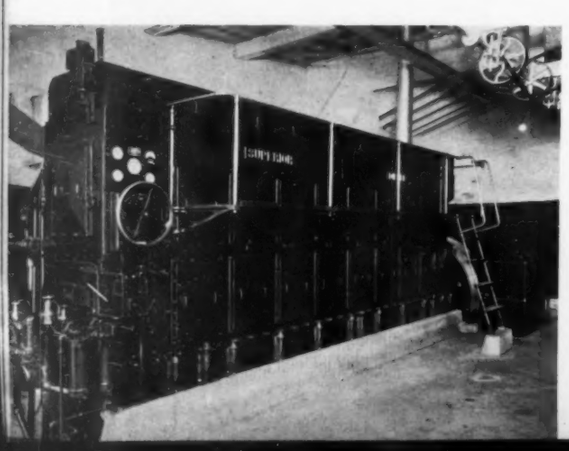
A steadily increasing demand for the materials produced by this mill again made necessary the addition of a modern, vertical, hydro-electric generating unit of 1,000 hp. capacity. This change was made in 1924.

In 1927, Mr. B. E. Jordan, now treasurer of Sellers Manufacturing Company, joined the organization and took over active management of the mill, and a modernizing program was started. The mill was remodeled, obsolete machinery removed, and the latest type of fine combed yarn machinery installed. As a further development, a new warp mercerizing plant was added, and in 1929 a modern silk throwing plant of 5,000 pounds capacity per week was added. At this point, the steam power plant was discarded, and Mr. Jordan's progressive ideas were responsible for the installation of a 500 hp. Diesel engine for belt drive to a generator.

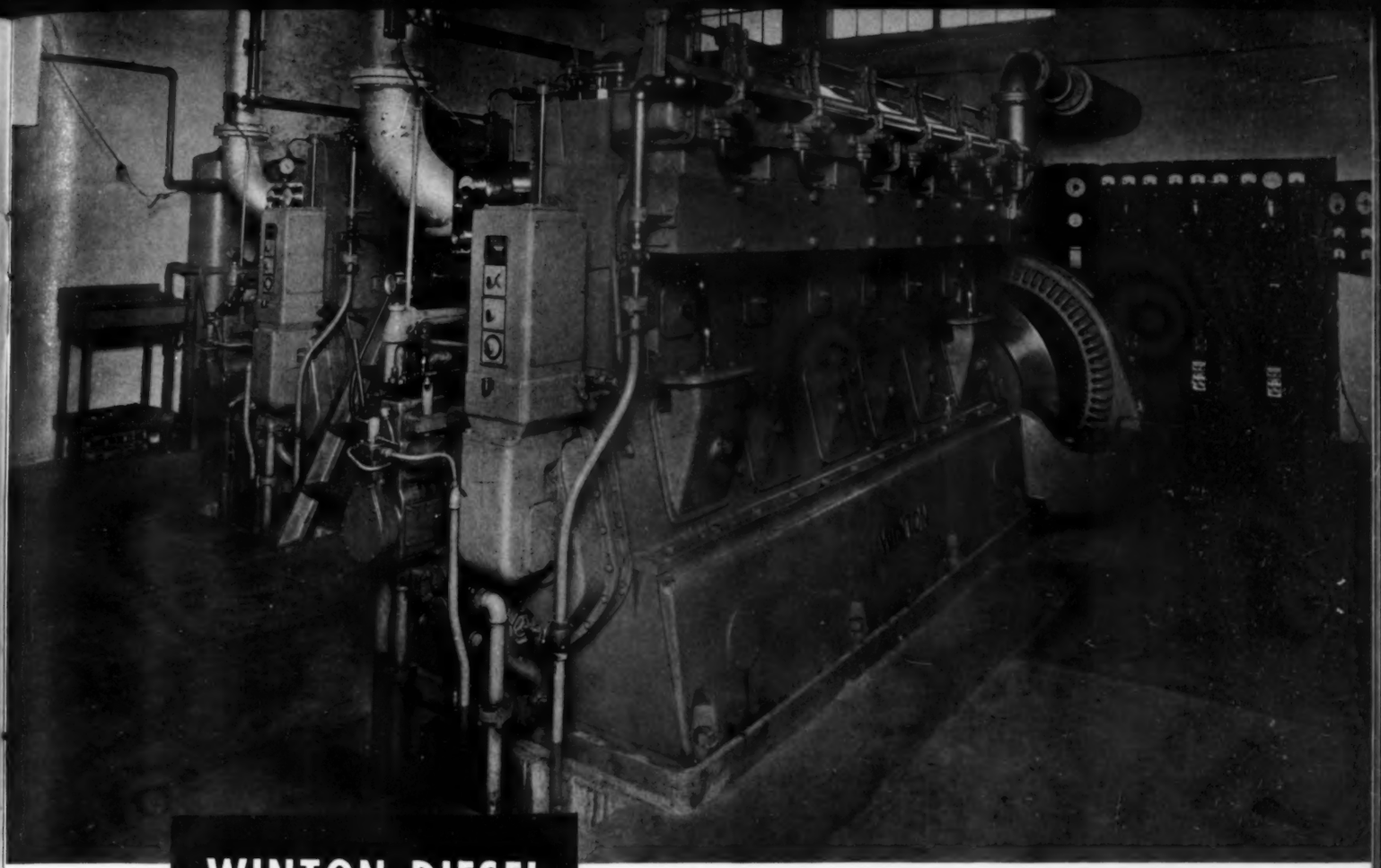
Still keeping pace with a rapidly developing industry, the Sellers Manufacturing Company, in 1933, installed long draft spinning equipment, new card room equipment, and a modern novelty yarn mill as a division of the silk mill. In 1934, a Hungerford & Terry water filtration and water softening plant was installed.

In 1935 further additions were made to bring the capacity of the silk mill division of the plant to 15,000 pounds per week. Additional long draft spinning and carding machinery were placed in the cotton spinning mill and at the beginning of 1936 5,000 more long draft spindles were purchased, making this one of the most important producers of novelty and fine yarns in this country. The output of the silk mill division is used to make full fashioned

. . . *And now please turn to page 56*



Power cost for this Diesel operating the textile mill is five mills per kilowatt hour. This includes fuel and lubricating oil, labor and maintenance.

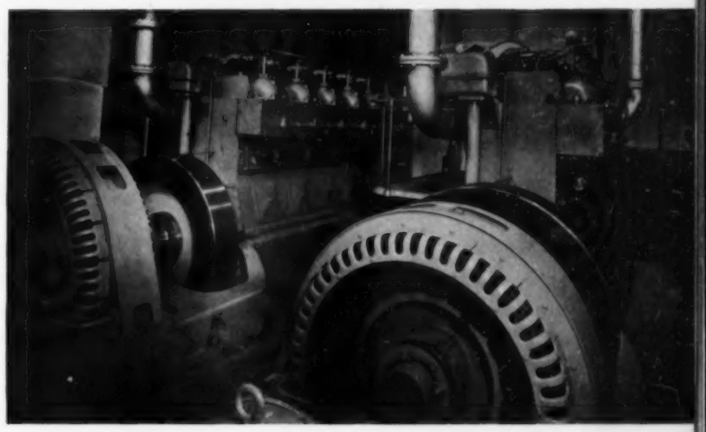


WINTON-DIESEL ENGINES *Increase Power Facilities of Arcade, New York, Municipal Light Plant*

Above: Three-quarter view of 500 h.p. and 325 h.p. Winton-Diesel engines installed in Arcade Municipal Light and Power Plant

Right: Four-cycle, 350 k.w. and 225 k.w. alternators and exciters direct-connected to the Winton-Diesel Engines

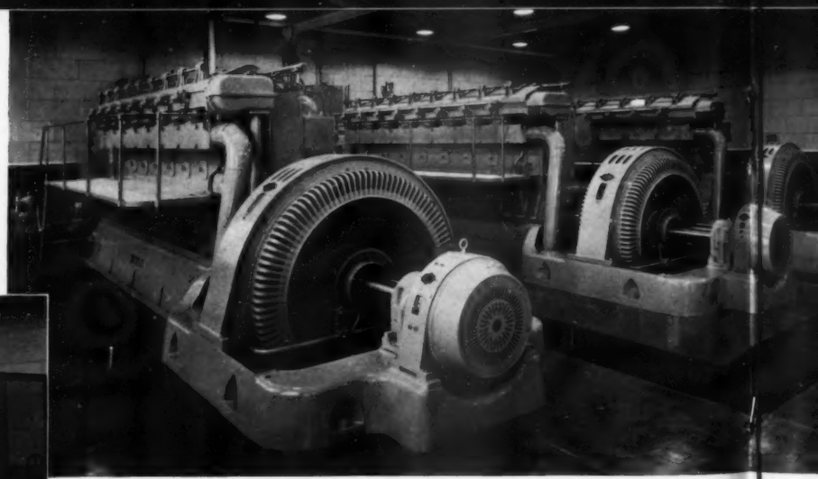
Below: Arcade Municipal Light and Power Plant Building, Arcade, N. Y.



THE Winton-Diesel engines recently installed in the Municipal Light and Power Plant in Arcade, New York, successfully carry the current load previously purchased from a utility company. The plant consists of one 500 h.p. six-cylinder, 4-cycle, Winton-Diesel engine, generating 350 k.w. at 360 r.p.m. and one 325 h.p. four-cylinder, 4-cycle Winton-Diesel engine generating 225 k.w. at 360 r.p.m. This new Winton power plant carries the entire load during non-heating months and in the winter supplements a steam-driven unit of 250 k.w. capacity that also distributes exhaust steam for heating purposes. Here the combination of steam and Winton-Diesel power is ideal, since the sale of steam in addition to steam-generated power is profitable and all energy required above steam-generated power is supplied at low-cost by the new Diesel units. This example of Winton-Diesel efficiency is typical of many instances where dependable, economical Winton-Diesel engines solve perplexing municipal power problems.

Above: General view showing three 700 h.p. eight-cylinder Winton-Diesel engines installed in Tipton Light and Water Plant

Below: Giant remote-control switchboard of the new Tipton power plant. Equipped with master clock to regulate current frequency, making possible the use of electric clocks on Tipton current



Above: Three-quarter view of three direct-connected 485 k.w., 60-cycle three-phase alternating current generators with direct-connected exciters

Right: Newly modernized home of Tipton Light and Water Plant

SYMBOL OF ECONOMY AND DEPENDABILITY

WINTON POWER PROVIDES LOW COST CURRENT IN NEW TIPTON, INDIANA, LIGHT AND WATER PLANT

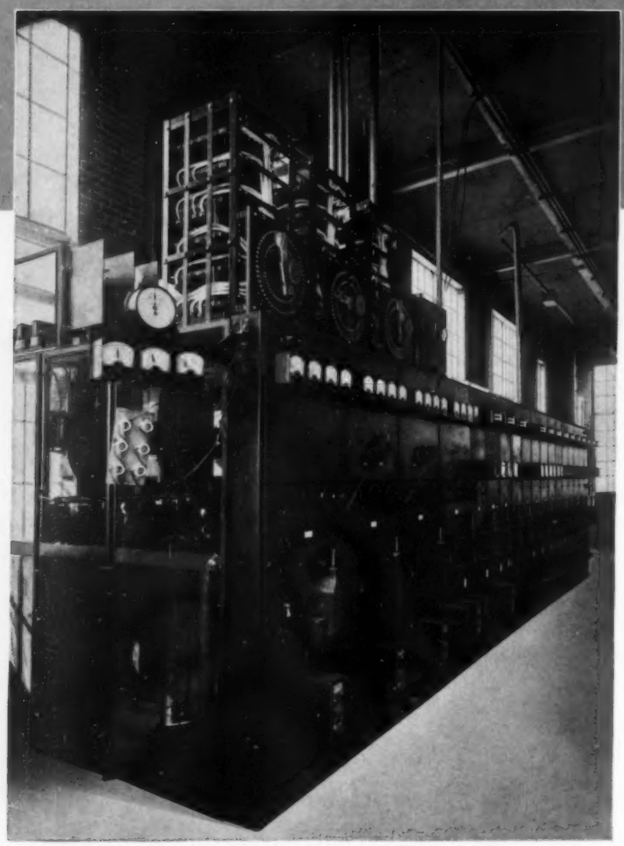
THE City of Tipton, Indiana, one of the first to operate a municipally-owned steam electric generating plant, has turned to Winton-Diesel power for more dependable and economical operation. The new Winton-Diesel plant is the source of electrical current for Tipton and surrounding communities including four large industrial concerns and the municipal waterworks. The new plant consists of three 700 h.p., eight-cylinder, four-cycle Winton-Diesel engines direct-connected to 485 k.w. alternating current generators with direct-connected exciters providing 2400 volt, .8 power factor, 3-phase, 60-cycle current. A manually-operated remote-control switchboard of latest design contains the customary generator and exciter panels, with circuit panels for street lighting, industrial power and general illumination.

These new Winton-Diesel units will generate more than 1,250,000 k.w. hours per year, saving the City of Tipton an estimated thirty-five thousand dollars per year over purchased power and double this amount as figured against steam operation. To date the new Winton-Diesel plant has distributed continuous current, with exceptionally close frequency and voltage regulation. This remarkable continuity of service, dependable performance and low-cost operation makes the new Tipton plant a very profitable property for the city and marks another outstanding achievement in the history of Winton-Diesel power.

WINTON ENGINE CORPORATION
CLEVELAND, OHIO, U. S. A.

WINTON-DIESEL POWER

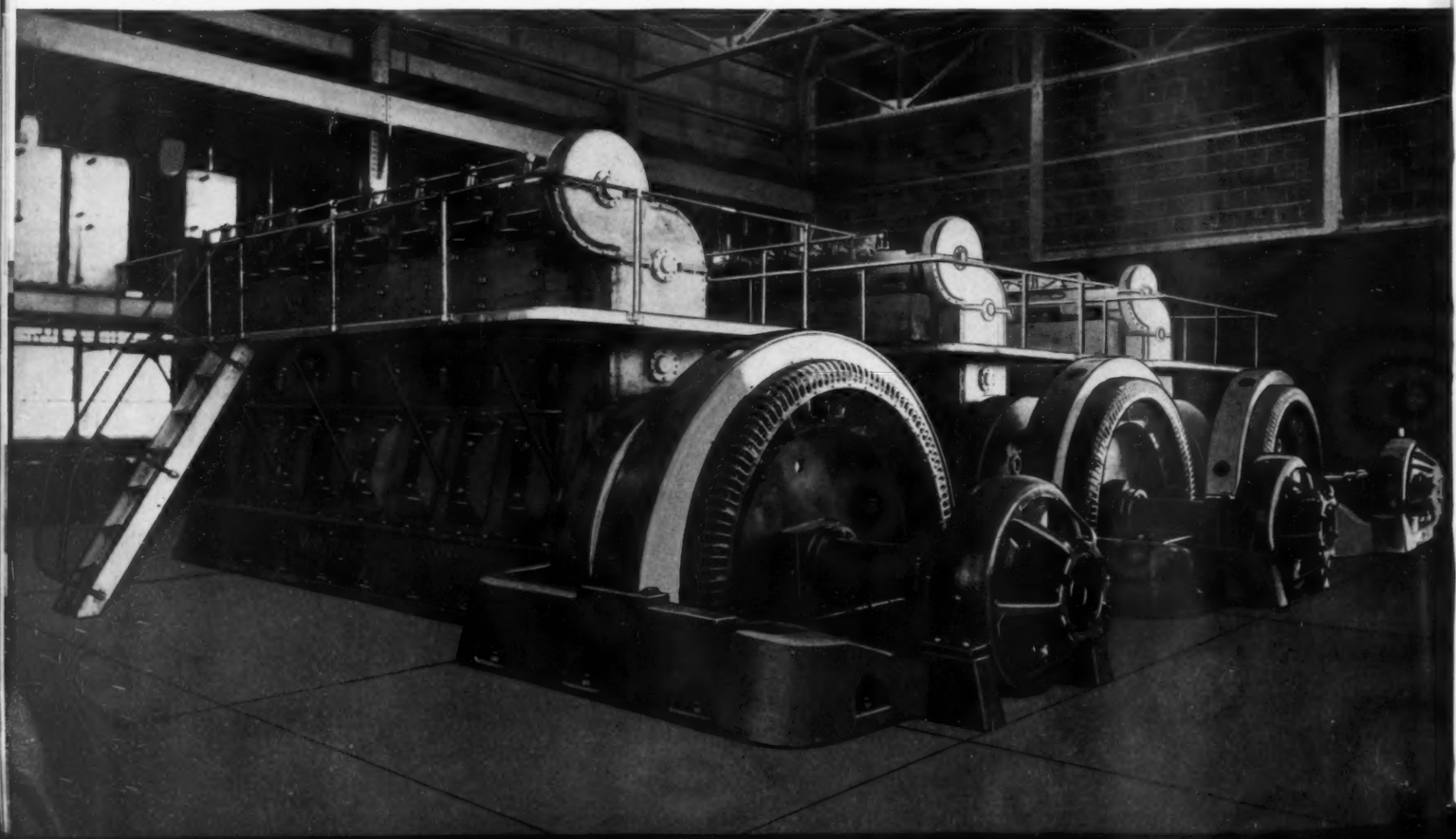
PROVES ITS VERSATILITY IN THIS JUTE CORDAGE SPINNING MILL

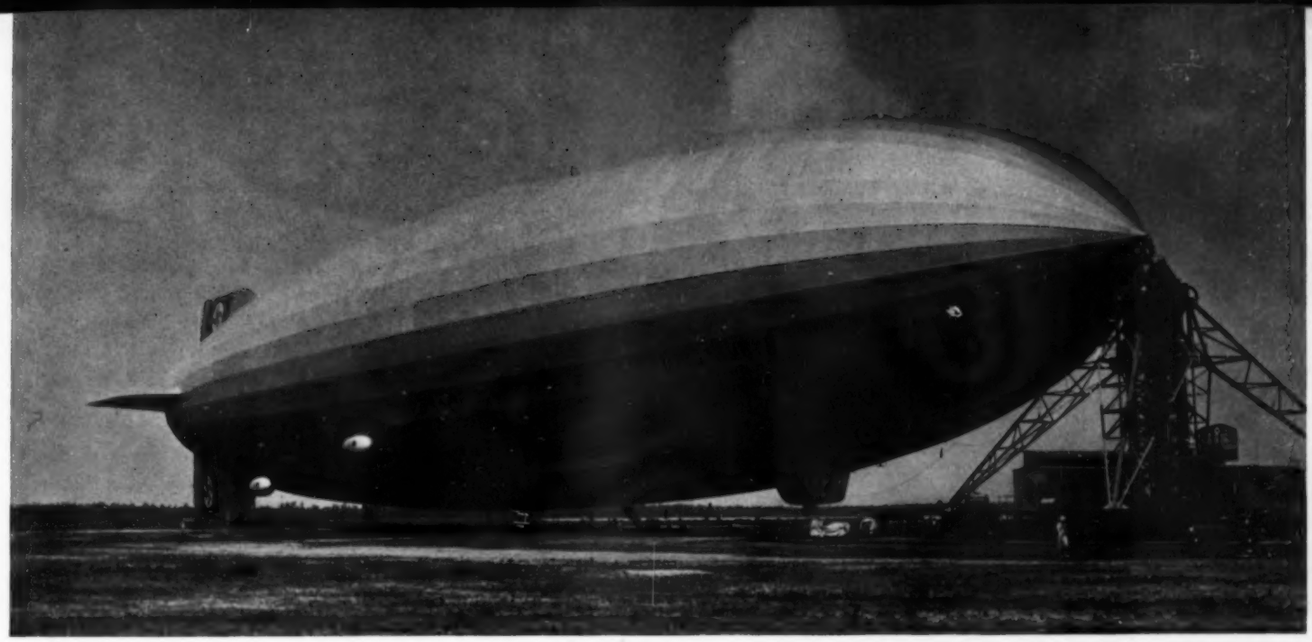


Above: Giant switchboard of new Winton-Diesel plant in jute cordage spinning mill

Below: View showing the three 1000 h.p. Winton-Diesel engines installed in the Delaware jute cordage spinning mill

ONE of America's largest Diesel industrial projects is the Winton-Diesel power plant recently completed for a jute cordage spinning mill at Edge Moor, Delaware. This new power plant consists of three 1000 h.p. Winton-Diesel engines direct-connected to 600-volt, .8 power factor, 700 k.w., 3-phase, 60-cycle alternators with direct-connected exciters; and one 165 h.p. Winton-Diesel engine that provides power over week-ends and holidays. This plant is the only source of power for the entire mill. Each engine has an individual cooling system and engine-circulating water pumps. Exhaust waste heat boilers attached to each engine supply the mill with steam for processing. This huge Winton-Diesel plant was installed after careful analysis of operating costs as against purchased power . . . proving again that the economical operation and dependable performance of Winton-Diesel power are exceptionally well adapted to meet individual industrial requirements.





The "Hindenburg" at its mooring mast at Lakehurst.

AIR PROGRESS

By PAUL H. WILKINSON

THE period between September 1 and October 10 has been set aside by the National Aeronautic Association for the observance of "Air Progress," during which time the achievements of aviation in the United States in the past twelve months may be recalled. It has been suggested that efforts should be made to enlist the support of the public, as well as that of State and municipal officials, and civic and commercial organizations, toward an even greater record of accomplishments during the coming year. As the aviation article in this issue happens to be the twelfth of a series which started a year ago, it would also seem to be an appropriate time to review the achievements in the Diesel aircraft field.

With regard to airships, progress in the United States has been conservative, to say the least. All that we have to show is a Preliminary Report on Lighter-than-Air Craft by the Air Commerce Planning Committee of the Business Advisory Council for the Department of Commerce. In the report, it is admitted that our activities are virtually at a standstill due to American indifference after the accidents to our Navy airships in previous years. The recommendation is made, however, that two large transoceanic airships should be built by private interests, aided by a government subsidy, for commercial operation. In addition, a new training ship for the Navy, capable of carrying airplanes, is suggested.

A further recommendation is included to the effect that the Navy should develop Diesel engines of from 1,500 to 2,000 hp. which could be used for both airships and airplanes. This is a wise suggestion, and it is to be hoped that it will be carried out without further delay so that we will not be dependent upon other countries for airship engines, as has been the case in the past.

The record for other countries, however, is quite impressive. In the Spring of 1936, the huge Diesel-engined airship LZ-129, the *Hindenburg*, was completed in Germany at a cost of approximately $3,000,000. Since May, eight round-trips have been made between

The "Aeolus" arriving at Port Washington from the Azores.

German Railroads Information Office, New York.

Crew of the "Aeolus" after landing at Port Washington. Left to right — Capt. H. W. von Engel (flight commander), H. I. Stein (radio operator), Capt. F. von Buddenbrock (second pilot), O. Grushwitz (flight engineer), and Capt. Rudolf Jahn (representative of Deutsche Lufthansa in the United States) who was there to meet them.

Europe and the United States, and four round-trips to Brazil. Capacity loads of passengers, mails and freight were carried, and so successful did this new form of transportation prove, both on the North Atlantic and the South Atlantic routes, that the original passenger accommodations had to be increased so that seventy-two people could be carried instead of fifty, exclusive of crew. Construction of another ship, the LZ-130, is already well under way, and a third one, the LZ-131, will be started soon.

In the heavier-than-air, or airplane, branch of the industry, the recent arrival of two Diesel-engined flying boats from Germany is still fresh in the minds of the public. This outstanding achievement did not receive the prominence in the press which it deserved, and the fact that non-inflammable fuel was used, constituting a definite milestone in the progress of aviation, was overlooked by practically all those who described the event.

These two Dornier *Do 18* flying boats are making survey flights of the North Atlantic for Deutsche Lufthansa, as was predicted by the author in the June issue of DIESEL PROGRESS. There is nothing experimental with regard to the planes themselves, but only with regard to the route, as similar equipment is operating on regular schedule across the South Atlantic.

The *Zephir*, piloted by Capt. Blankenburg and carrying on board a director of Deutsche Lufthansa, was catapulted on September 9 from the *Schwabenland*, stationed near Horta in the Azores. All kinds of weather were encountered en route, but the flight to the Pan-American Airways marine base at Port Washington, near New York, was brought to a successful conclusion when the plane and its crew of five arrived on September 10. The 2,400-mile flight was completed in about 22 hours at an average speed of 110 mph.

The second ship, the *Aeolus*, followed a more southerly route from the Azores to Bermuda, and thence on to Port Washington, arriving on September 12. The two legs of this route were 2,063 miles and 700 miles long respectively, and the total distance of 2,763 miles was covered in a little over 24 hours' flying time.

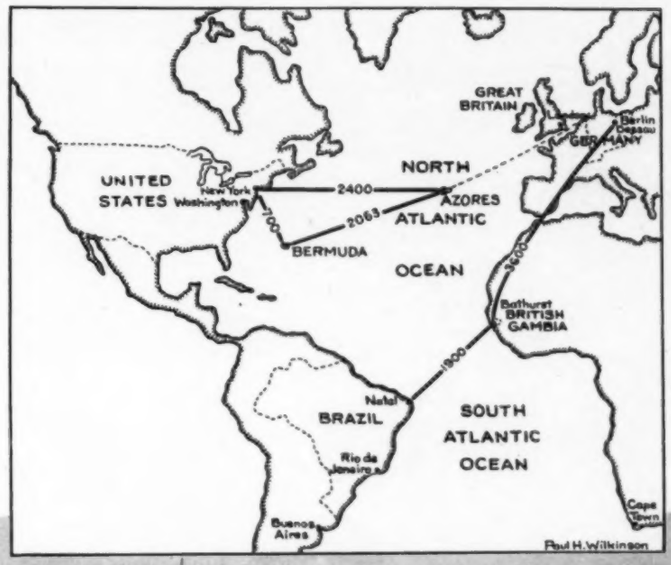
The author was privileged to witness the arrival of the *Aeolus*, and it was indeed a thrill to see this sleek grey plane come into view and circle the air station before landing. A noticeable feature was the powerful beat of the exhaust, which was much faster and smoother than from a gasoline-engined plane. This is due to the two-cycle operation of the Diesel engine, in which there is an explosion and a power stroke in each cylinder for each revolution of the crankshaft. The skillful landing was impressive, after which flags were rapidly unfurled on the plane — an American one on top of the wing, a German one at the stern, and a Deutsche Lufthansa one at the bow.

The crew, as will be seen from the photograph, did not appear at all tired after their long trip. Capt. H. W. von Engel, who was in charge, said that radio communciation had been maintained at all times with the *Schwabenland*, and with the land station at Port Washington.

Junkers "Ju 86," the "Buckeberg," on its 3,600 mile non-stop flight from Dessau to Bathurst.

Prior to these North Atlantic trips, an extensive test flight had been made from the *Ostmark* off the German coast. During this flight a distance of 2,800 miles was covered at a speed of 140 mph., and the fuel consumption was found to be about 0.35 lbs. per hp. per hour, which is equivalent to 21.8 gallons per hour for each engine.

Turning to the larger flying boats, construction work has been proceeding rapidly on the Dornier *Do 20*, the big eight-engined plane which Deutsch Lufthansa expect to have in operation next year. It will have a flight range of about 3,000 miles, and will cruise at 155 mph., with a top speed of 180 mph.



On land, the most notable accomplishment during the past twelve months was the non-stop flight of the Junkers *Ju 86* high speed mailplane, the *Buckeberg*, from the factory at Dessau to Bathurst, British Gambia. Bathurst will be recalled as the point of departure of the Deutsche Lufthansa planes on the 1,900-mile hop across the South Atlantic to Brazil, so it looks as

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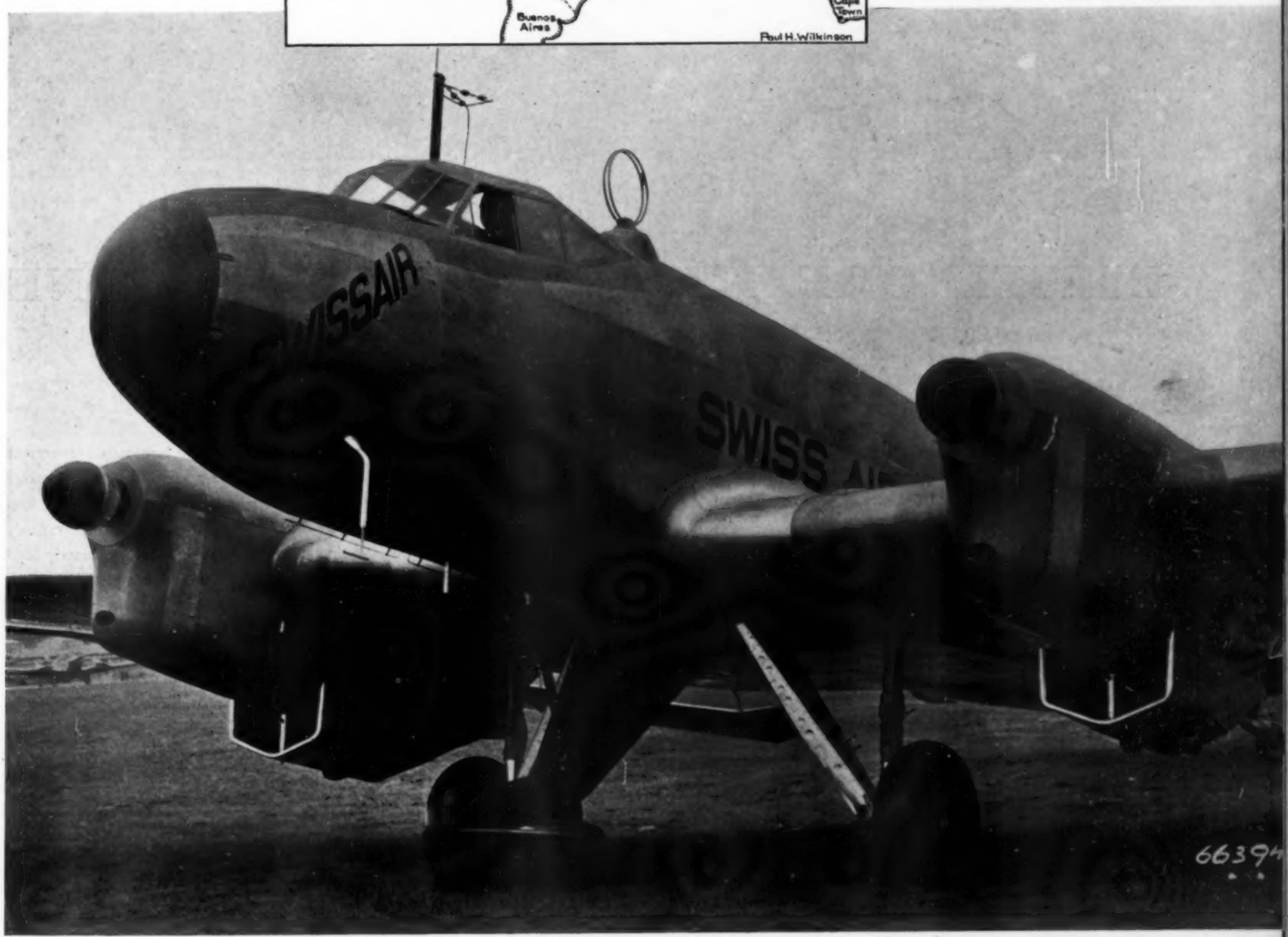


"Air Progress" in 1936. Map showing long-distance flights by Diesel-engined planes over land and sea.

DIESEL ORE MILL AT PENELAS MINE

By R. W. STRONG

AN interesting example of what up-to-date milling methods and the adaption of Diesel power is doing for the mining industry is provided by the Penelas Mining Company, which has its head office in Fallon, Nevada. This property, situated in Nye County, Nevada, was originally location by one Silverino Penelas, old time Portuguese prospector, and was acquired in 1931 by L. D. Gordon, veteran Nevada mining man and general manager of the present company.

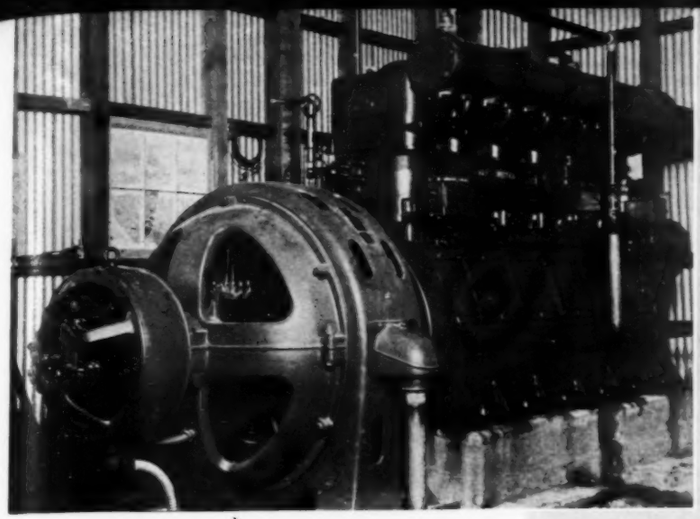
Considerable development work was done in the following years, including the relocation of the old shaft and sinking it to the three hundred foot level. Severel hundred feet of tunnel were driven on the one, two and three hundred foot levels, and much ore blocked out. The ore is gold and silver occurring in a mineralized fault-vein in rhyolite porphyry. The ratio of silver to gold varies from 4 to 1 to as high as 20 to 1, and occurs as free gold, free silver, electrum and silver sulphide.

In the summer of 1935 it was decided to build a 40 ton cyanide mill and C. E. Chaffin, designer of several mills in the Flin Flon and Northern Manitoba, was retained for the job. J. Davis was in charge of mill construction, while James McLaughlin, another veteran of the Nevada mining field, who had been in charge of development work, became mine superintendent.

Naturally, in such an isolated location as the Penelas property, the question of power was first raised. The mine is ninety miles from the railroad at Hazen, and at least twenty miles of this consists of two ruts through the sage brush, subject to almost impossible conditions of mud during the spring thaw and subsequent rains. Transportation problems were therefore very real.

With coal at $14 per ton at the railroad, plus $5 per ton freight out to the mine, a steam plant was out of the question. The nearest Utility Company's power line was twenty-five miles away, so that the building and maintenance of an extension line would represent a considerable investment in itself. The cost of constructing a transmission line over this desert and mountain terrane, conservatively estimated, would have run approximately $900 per mile or $22,500 for the complete line. The cost of the Diesel-electric plant was in the neighborhood of $12,000 or about $10,500 less than the cost of the transmission line. This saving is augmented by the fact that over a 25-mile distance the transmission losses would be approximately 3 per cent and to this would be added other losses for distribution, transforming, etc., of between 15 per cent and 20 per cent. From the standpoint of transmission line cost and losses, purchased power at even 2c per kwh. would have been prohibitive.

A Diesel-electric set-up was decided upon, but another factor to be considered in consequence of adverse transportation conditions was the moving of the prospective power unit out to the property; such a unit had to be light enough to move across mountain roads yet



The 200 hp. Atlas Diesel which solved the power problem at Penelas Mine.

rugged enough to stand continuous 24 hour per day duty.

The unit chosen was a 200 hp. six cylinder full Diesel, built by the Atlas Imperial Diesel Engine Company of Oakland, California. This is one of the Atlas Company's standard engines developed for mining, construction and industrial needs and is of the cold starting, solid-injection type with 9" bore by 10½" stroke. The engine is direct coupled to a 156 kva. 440 volt 3 phase 60-cycle generator running at a normal speed of 514 rpm.

The engine and alternator are set up on a solid concrete foundation in an engine house separate from the rest of the mill, but connected by a covered runway so that the solution man on shift can make periodic inspections of the Diesel-electric plant in conjunction with his routine work. No other operator or attendant is on duty in the engine house, as the set is self-governing and self-regulating, irrespective of the load in the mill.

An interesting feature in the mill design, made possible by the centralized Diesel-electric plant, is the elimination of much of the customary shafting, pulleys and belts by the adaption of independent drive motors. Thus the only shaft in the mill is the line shaft driving the three thickeners, an air-lift agitator and several mud pumps, representing an aggregate load of about 7 hp.

The following gives the distribution of power throughout the mill and the size of the motors on the various equipment:

Mill and camp lighting circuits	7.5 hp.
Line shafting driving thickeners, agitators and mud pumps	7.5 hp.
Compressor for air lift agitator	15.0 hp.
Vacuum pump	15.0 hp.
12′ by 10′ Portland filter	5.0 hp.
Tailings stacker	5.0 hp.
Several small motors amounting to approximately	5.0 hp.

A panorama of the Penelas Mine, which is ninety miles from the nearest railroad. Dependability is a prime requisite on an isolated job like this.

This load of 60 hp. is on 24 hours a day, and at no time can item 2, the line shafting driving the thickeners and agitator, be shut down as the slime must be kept in motion, otherwise it will settle.

The following load is on 24 hours a day, but may be shut off or thrown on from time to time during operation. This throws a severe

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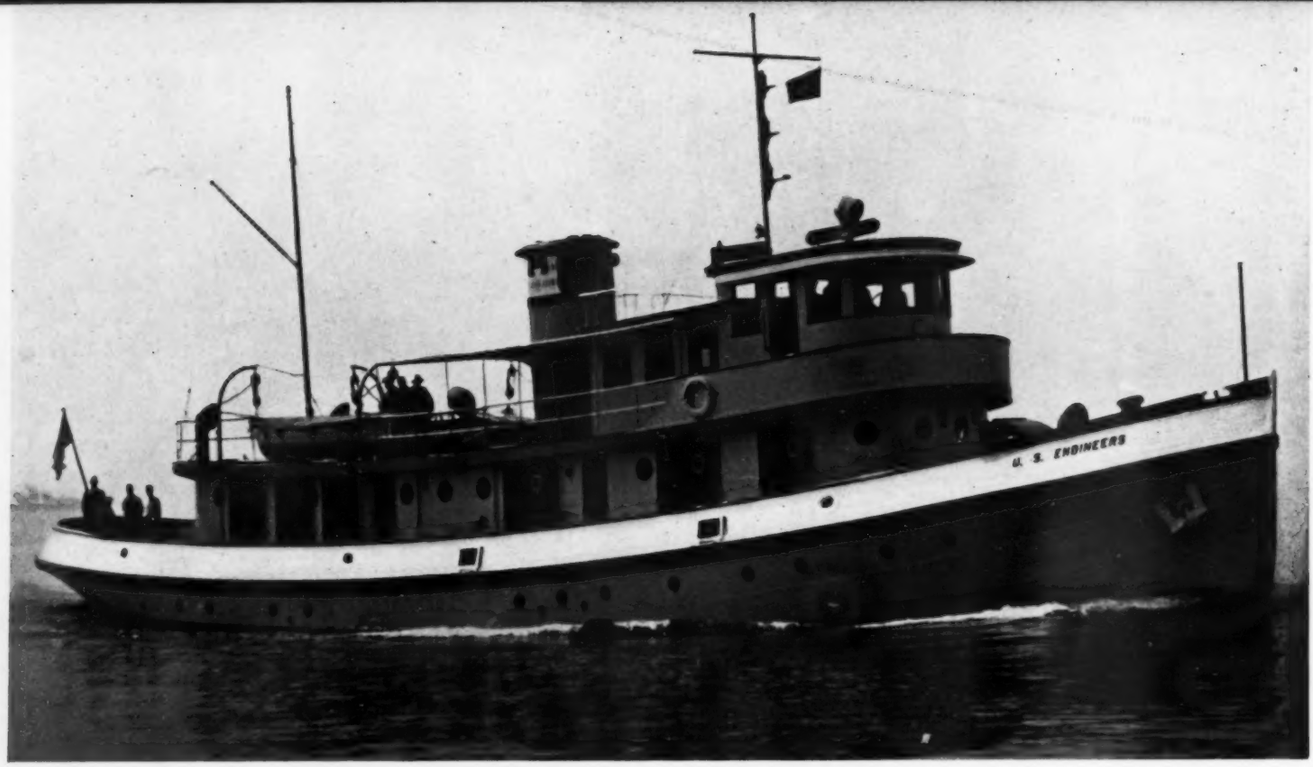
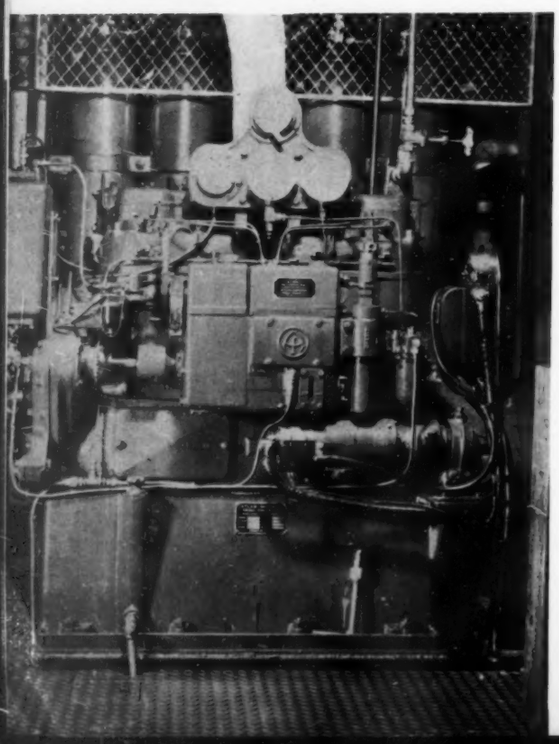


The new U. S. Army Engineers' Survey Ship, "Robert Gray." Below — 30 hp., 4-cylinder Atlas Imperial Diesel generating set.

DIESEL SURVEY SHIP

By CHARLES F. A. MANN

HOLDING the distinction of being the lone steel vessel completed on the Pacific Coast during 1936, as of September 2, the new U. S. Army Engineers Survey ship *Robert Gray,* was completed and turned over to her operators for duty on the Columbia River and the Oregon Coast.



Unique is her power plant, being the last word in Diesel-electric design, with twin generator sets and a 550 hp. propulsion motor neatly placed in a roomy, two-deck-high engine room amidships and fully controlled from the pilot house. Alone of all types of power plants offered the marine industry today, the Diesel-electric is the only type that can be controlled easily in the pilot house and will give hundreds of variations in speed at the flip of a finger.

And after all, the ability to maintain any set speed from a fraction of a knot against a stiff headwind, to full speed ahead with wind and tide behind, is the most desirable single quality of a survey ship that must chart river and sea courses and lay out plans for navigation aids for commerce in many types of water. She is 117′ 11″ by 25′ by 8′ 11″ in overall dimensions.

And that is mainly why the *Robert Gray* is the world's last word in survey ship design, and why she is Diesel-electric.

The ship is of heavy steel construction throughout, with plenty of beam and easy lines. She carries bilge keels to keep her steady in a cross-sea and has plenty of buoyancy forward to ride the wild Oregon storms with ease. Outside of some choice wood panelling in certain of the quarters, she is a steel ship throughout, with four water tight compartments below. Quarters are carried below and on the main deck, while the pilot house and chart room, both wood construction, are the "business office" of the ship, where positions of navigation aids are located and plans laid for the work of the survey crews.

Forward, below, is a large chain locker for two long strings of link chain for the anchors. Next aft are two staterooms for the mates and stewards, with suitable toilet and shower facilities. Then comes the engine room and beyond this the survey crew quarters with bunks for five. Next is a cabin for visiting officers' and the engineers' stateroom, with showers and lavatory between. A large storage space is located aft.

On the main deck is the Cunningham Anchor windlass, driven by a 10 hp. Westinghouse motor. In the steel deckhouse is the mess room and galley. The galley is equipped with a

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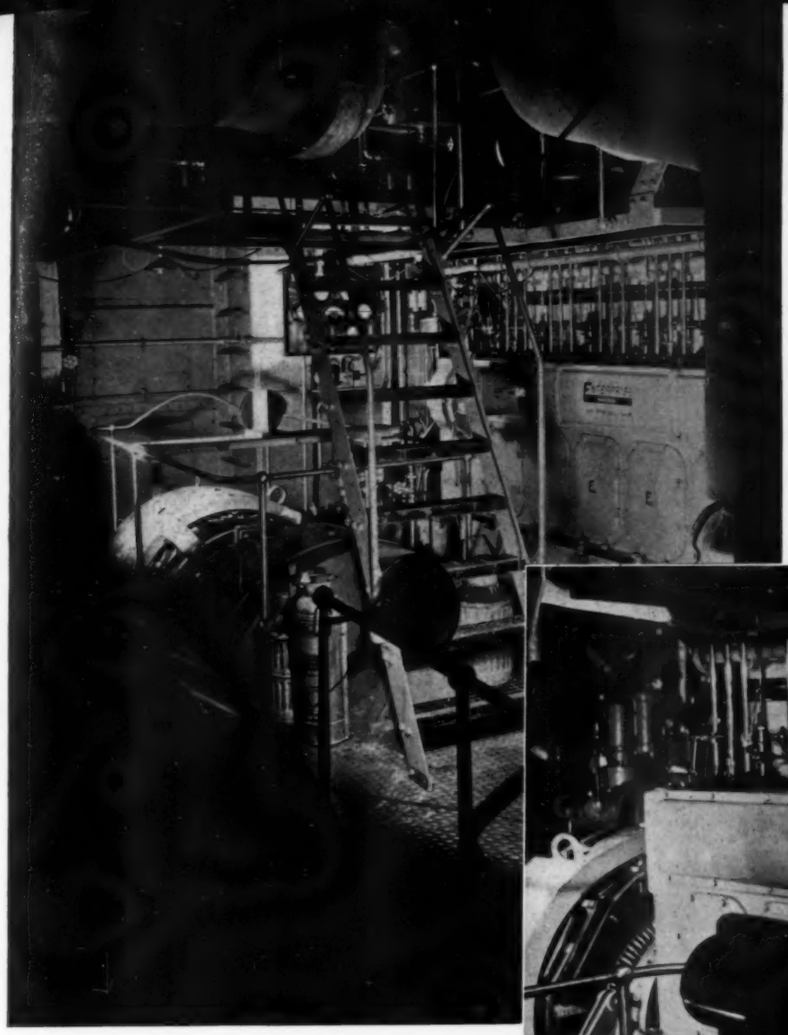
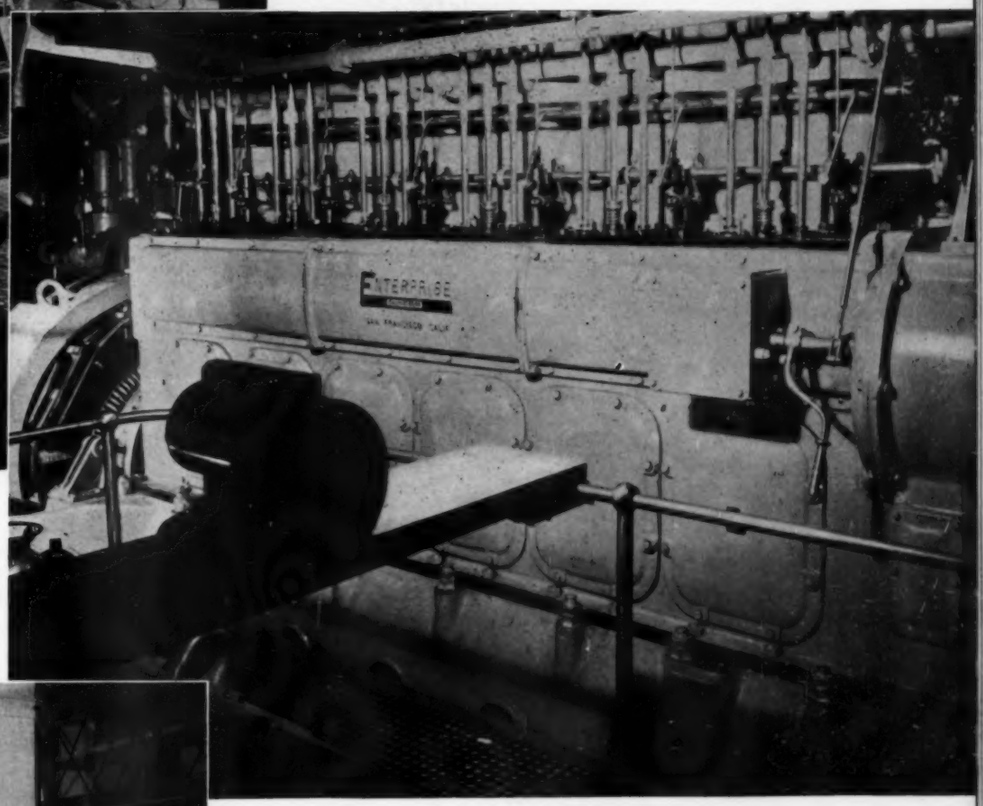
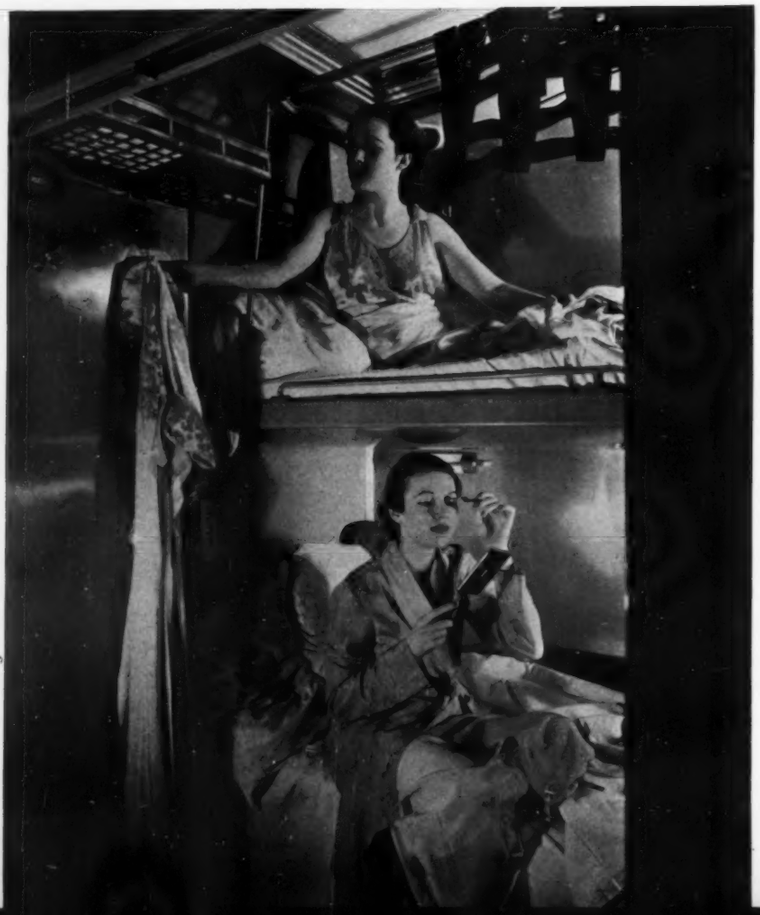


Quarter views of the "Roberty Gray's" engine room showing the 360 hp. Enterprise Diesels, main generators and Westinghouse propulsion motor.

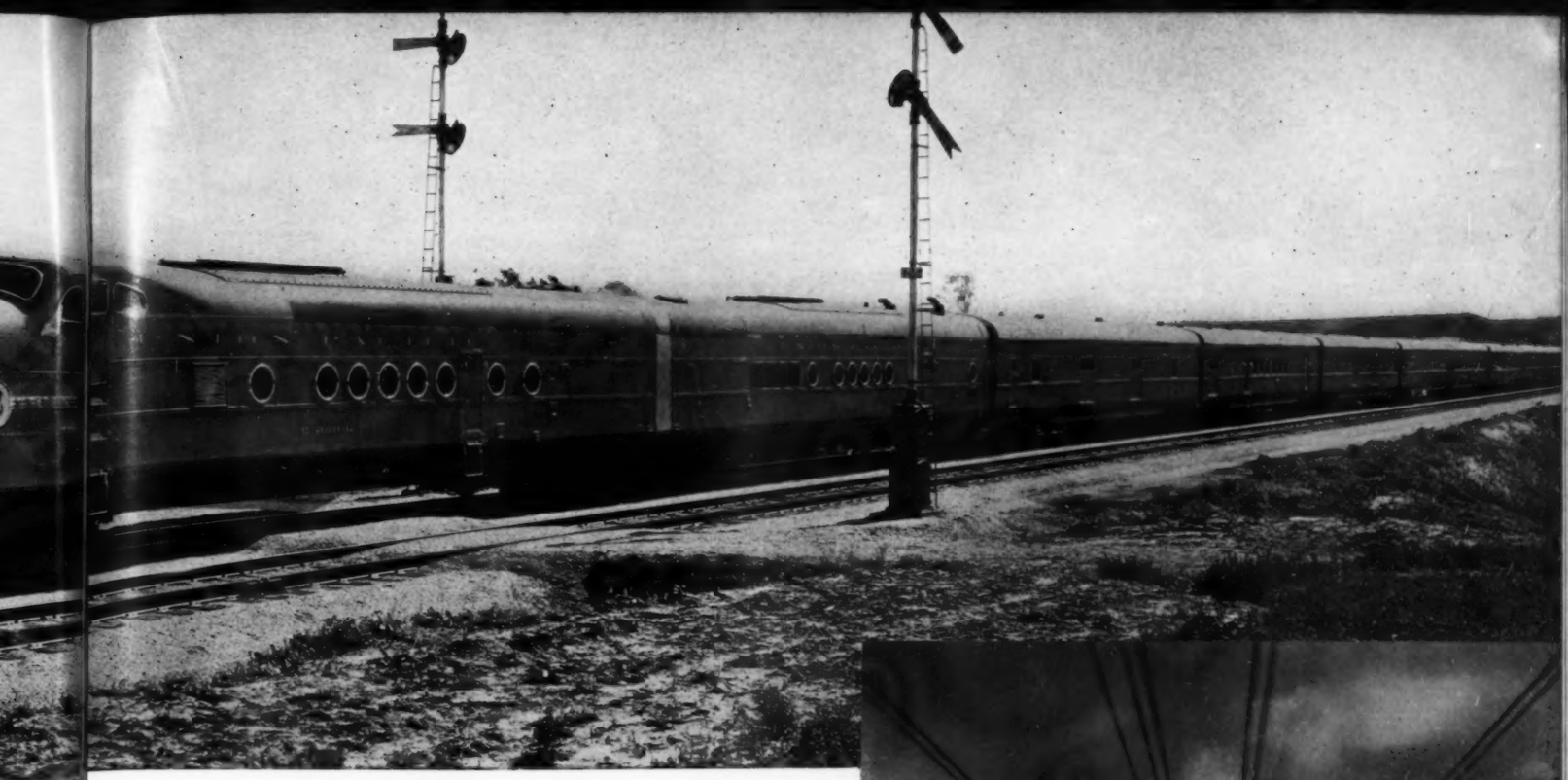


The beautifully walnut panelled Officers' Ward Room. In the galley view note the Kelvinator refrigerator opposite the stainless steel sink and Buell oil-fired cooking range.

STREAMLINERS "CITY OF DENVER"



TWO additional Diesel trains have been added to western rail service. The M-10005 and M-10006 have the greatest length, passenger capacity and fastest long-distance schedule of any Diesel streamliners yet constructed. Each train unit is driven by a 1200 hp. Electro-Motive Diesel-electric power plant and covers the distance of 1,048 miles between Chicago and Denver in a total elapsed time of 16 hours, including eight station stops. This requires an average running speed of 65.5 miles per hour although on a stretch of track east of North Platte, Neb., a maximum speed of 102 miles per hour is attained. The twin trains are constructed of aluminum alloy and their general description is quite similar to numerous other Union Pacific trains previously featured in DIESEL PROGRESS. From the point of view of luxurious interior furnishings, decoration and facilities for passenger comfort these two units are also the last word in modern design and thoroughly complementary to their ultra-modern construction and power plants. The new, Diesel era in railroading is hitting its pace.



Safety, passenger comfort and speed are the key-notes of Diesel, streamlined, railroad traffic. The illustrations clearly indicate what the present-day passenger between Chicago and Denver may expect.

M.S. "Vulcania" of the Cosulich Line after conversion. The illustrations below show one of the two 13,000 bhp. Fiat Diesels on test, a cross-section of this unit and the "Vulcania's" lower engine gangway as it now appears.

LONDON LETTER No. 11

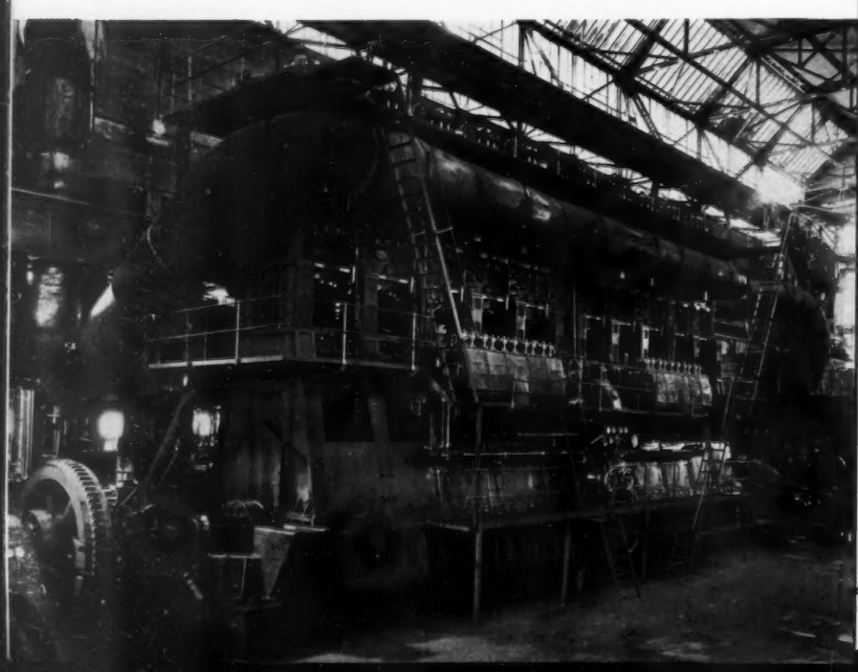
By GEORGE LIND

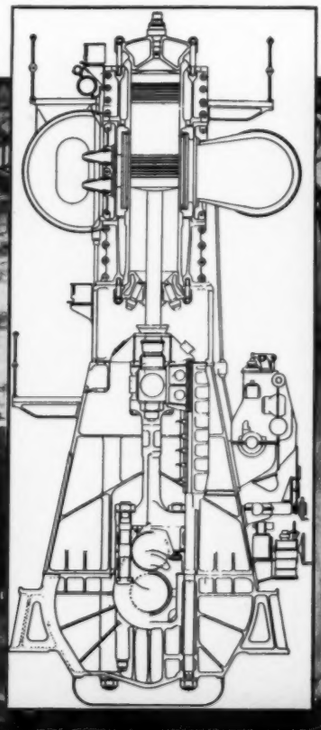
ACCORDING to the Lloyd's Register of Shipbuilding Returns for the quarter ended June 30th, 1936, the motor ship continues to make headway at the expense of the steam engine. At the present moment motor vessels represent 61 per cent of the total tonnage on the stocks and 66 per cent of the tonnage on order. Throughout the world there are now well over 400 marine Diesels commissioned, totalling approximately 1,400,000 ihp., or an increase of 400,000 ihp. over the figures a year ago. During the same period the output of steam power fell by 150,000 shp. in the case of turbines and rose by 230,00 ihp. for reciprocating engines, giving a net increase of roughly 180,000 ihp.

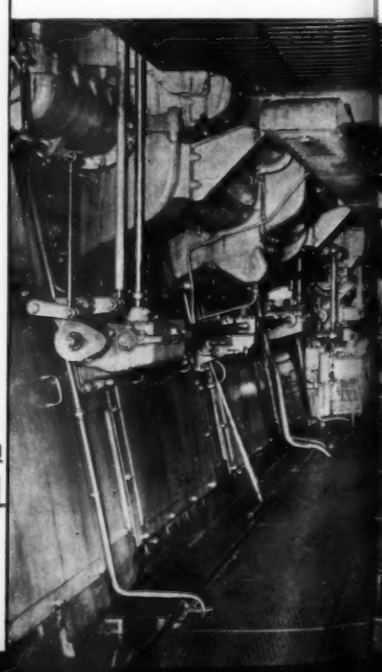
Among the countries building motorships, the United Kingdom still leads comfortably in gross tonnage under construction with a figure of 415,336 (243,996 in June, 1935), but is being challenged by Germany with 273,606 tons, the latter amount representing an increase of more than 100 per cent since June, 1935. After Germany come Sweden with 119,700 tons and Japan with 114,355 tons. America's total is so small as to be almost negligible. Incidentally, it is worth mentioning that for the first time in the history of shipbuilding Germany has more Diesel horsepower under construction than Great Britain, i.e., 267,935 ihp., as compared to 261,603 ihp.

Considering a few recent launches in this country, two characteristically noteworthy vessels emanating from that great shipbuilding concern, Harland & Wolff, Ltd., of Belfast, are the passenger liner *Kanimbla* and the cross Channel boat *Royal Scotsman*. As will be seen from the photographs, these vessels bear a striking resemblance, the one appearing at first sight to be virtually a miniature of the other. In actual fact, they differ widely, the services for which they are intended demanding entirely different constructional arrangements.

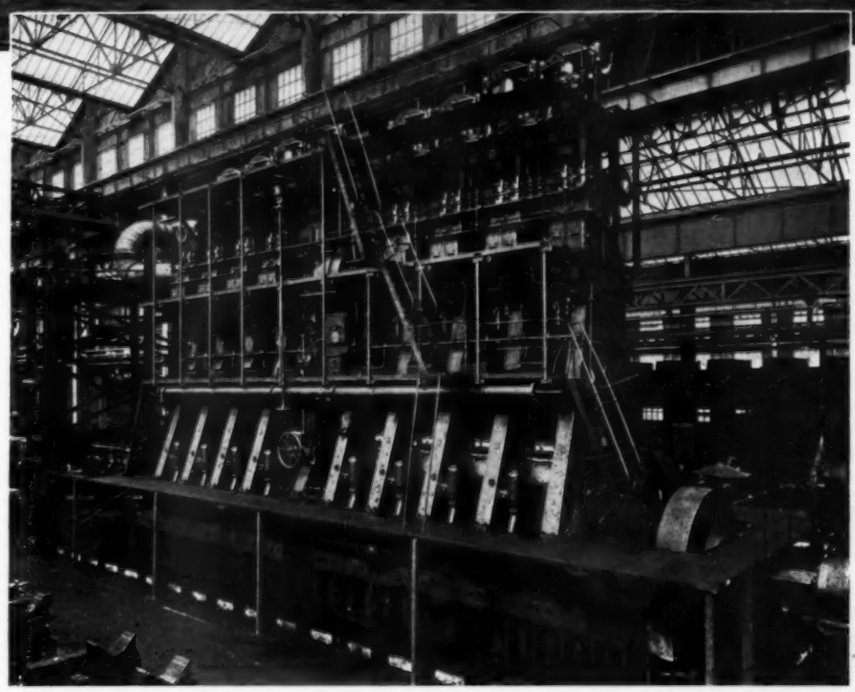
The *Kanimbla* is designed for the Australian coastal service of McIlwraith McEacharn, Ltd., and completed her preliminary trials at the end of April of this year. She is a twin screw







M.V. "Royal Scotsman" which the Burns & Laird Line had built for Glasgow-Belfast service. On the test stand is one of two Harland & Wolff 2,750 bhp. Diesel engines now installed.



vessel, built under Board of Trade and Lloyds survey, also to the requirements of the Australian service, her principal dimensions being as follows:

Length overall	494 feet
Length B.P.	460 "
Breadth moulded	66 "
Depth moulded	36 "
Gross tonnage	10,970
Service speed	16½ to 17 knots
Engine power	10,000 ihp.
Accommodation	203 first class 200 cabin "

The vessel has been planned on modern lines with a well raked rounded stem, cruiser stern, two raked masts, and a single low streamlined funnel. These points, together with a well rounded Bridge front, give the vessel a distinctive and well balanced appearance.

Perhaps the most outstanding feature of the ship is the provision of a Broadcasting Studio, complete with all the technical equipment necessary. Great care has been expended on this, and the leading experts have been responsible for the designing and fitting up of the whole scheme, the latest experience of the best Broadcasting Studios in Europe being drawn upon. There is an Announcer's Room fitted with equipment and controls, and adjoining this is the Studio proper, in which the artistes give their concerts and entertainments. The Australian Government has given a license — the first of its kind issued by the Australian Postmaster General. Under this authority the *Kanimbla* becomes the first passenger vessel in the British Empire licensed to transmit programs for broadcasting throughout Australia from the sea to the shore.

The propelling machinery consists of two eight cylinder four stroke, single acting cross-head-type engines of Harland — B & W design (740 mm. bore, 1,500 mm. stroke) arranged with airless injection and pressure induction. The normal speed is 108 rpm., and the output for each engine is 5,000 ihp. Air for pressure induction is supplied to the inlet manifolds by turbo-blowers driven by the exhaust gas from the main engines. The engines are maneuvered by compressed air stored in two large cylindrical reservoirs, and charged by electrically-driven compressors. The pistons are cooled with lubricating oil, and for the jackets and cylinder covers fresh water is used. The electrical installation is supplied by four Diesel driven generators of the builders' make, each having an output of 300 kw., and, in addition, one 50 kw. oil driven emergency generator installed above the margin line. In addition to the lighting, the whole of the deck machinery auxiliaries are electrically driven.

The "Royal Scotsman" was built for the Belfast-Glasgow service of the Burns Laird Lines,

Ltd., and has the following leading characteristics:

Length overall	341 ft. 6 ins.
Length B. P.	320 ft.
Breadth moulded	47 ft. 6 ins.
Depth moulded	17 ft. 9 ins.
Gross tonnage	3,244
Power	5,500 bhp.
Trial Speed	19 knots
Accommodation	219 first class 108 third class

The main engines are again of Harland-B. & W. manufacture, the two stroke cycle being used in this instance. Each has eight cylinders of 500 mm. bore and 900 mm. stroke. The design embodies uniflow scavenging, poppet exhaust valves, and tuned exhaust pipe arrangement. Air for scavinging and combustion is delivered to the cylinders by a pair of rotary blowers of the positive displacement type situated at the backs of the engines, and driven by means of gearing from the crankshaft. The poppet exhaust valves are operated by means of cams, push rods and levers, and the camshaft is driven by gear wheels from the crankshaft.

After completion the "Royal Scotsman" was taken to Broomielaw pier, where she was thrown open to the public. In the course of a few days over 15,000 people had visited her and admired her glistening Diesel machinery.

Abroad, most of the yards are occupied with new vessels of the tanker and cargo boat class, so that few really sensational launches may be expected for a month or two. One exception must, however, be made in the case of the new German seaplane base "Ostmark," intended for use on the South Atlantic air mail service.

In order to carry the mail across the 1,960 odd miles of sea, a steamer, the *Westfalen,* was first utilized by the operators, the German Lufthansa, as a floating ocean base. Later, a second vessel was found necessary and the M.V. *Schwabenland* was, therefore, taken into commission. When the new 10-ton Dornier flying boats were put into service, equipped with Junkers Diesels, it was decided to modernize the base ships as well, and in accordance with the firm's plans the *Ostmark* was ordered.

On the trial run of the M.S. "Kanimbla," also Harland & Wolff powered, intended for Australian coastal service.

The *Ostmark* was built by the Howaldtswerke A. G. of Kiel, and has a length of 245 ft., the beam being 37.6 ft. Two M.A.N. Diesels of 900 bhp. are fitted, and these give a speed of 14 knots. The engines are 10 cylinder units running at a speed of 310 rpm., the bore and stroke being 300 mm. and 420 mm. respectively. The two stroke cycle is used in conjunction with trunk-type pistons and Roots blowers. As will be seen from the accompanying illustrations, the engines are remarkably clean in appearance, and represent something distinctly unusual in marine engine design, the overall dimensions being some 20 per cent less than for normal units of this horsepower and type.

In contrast to the two earlier base ships which were merely conversions, the *Ostmark* has been planned specially for the job in hand, and carries full equipment for hauling seaplanes out of the water and launching them. (As a matter of interest, the *Ostmark's* catapult installation is capable of giving a boat weighing 15 tons a flying speed of 95 mph. before it leaves the ship). In addition, special attention has been given to the crew's quarters, the cabins having been made as large as pos-

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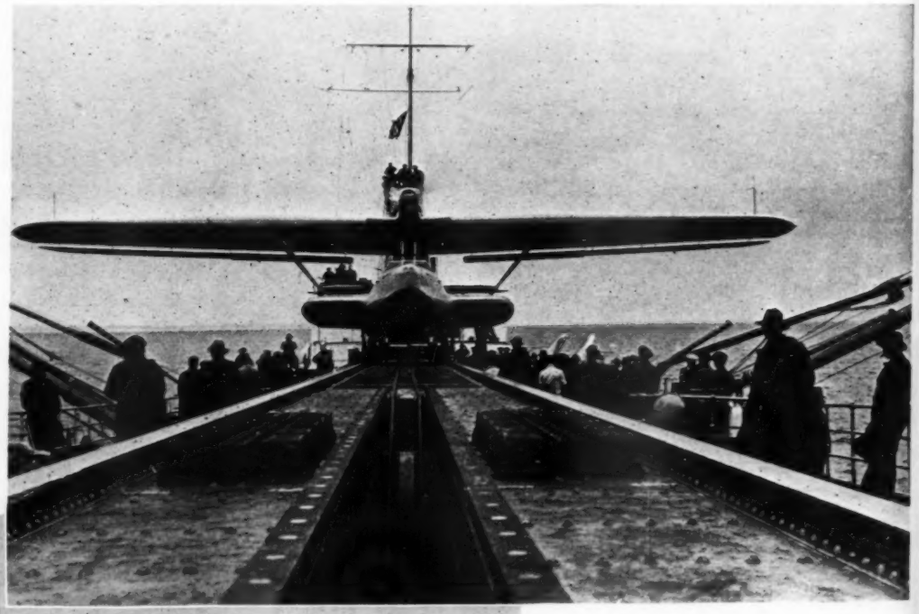
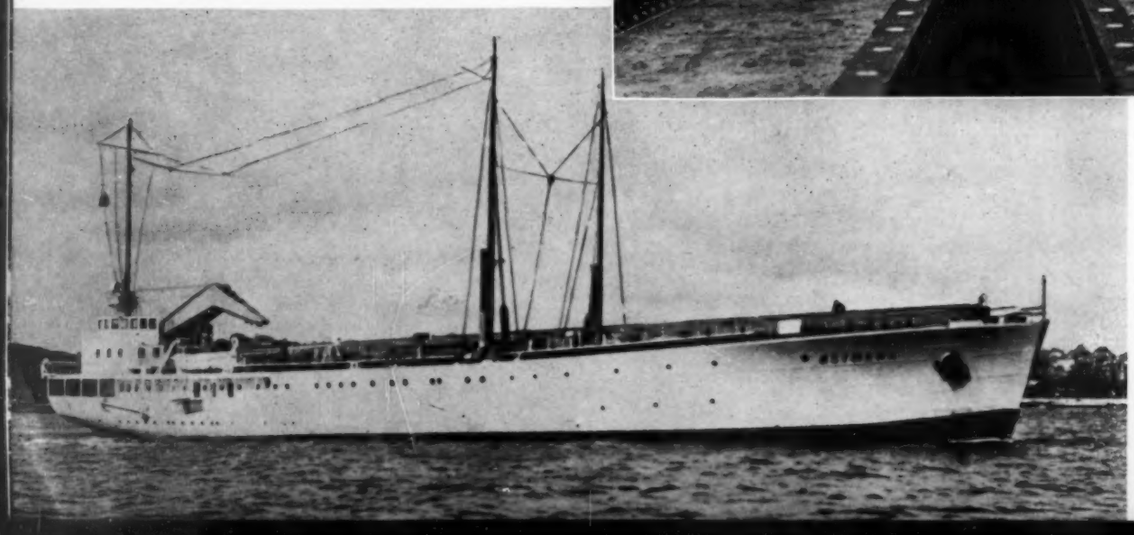




M.S. "Ostmark" and the catapult for the Dornier flying boat, Do-18. Regular, "heavier than air," trans-Atlantic service with this type of equipment may be expected at an early date.

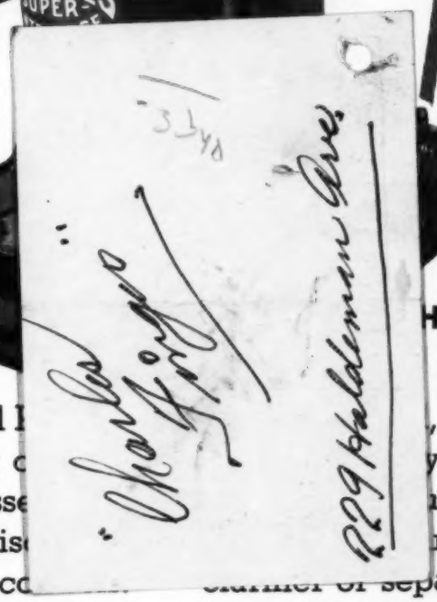
LET SHARPLES-PURIFIED OILS *Protect Your Engines*

FUEL OIL

Centrifugal purification of Diesel fuel oils permits the use of heavier, less expensive grades without operating difficulties.

LUBRICATING OIL

Centrifugal purification of lubricating oil reduces bearing wear, prevents clogging of the lubricating system, and reduces lubricating costs by saving oil.



HARPLES EN BLOC OIL PURIFIER

The Sharples En Bloc Centrifugal Oil P[urifier], although the lighter grades is a complete oil purifying plant. It c[an] be purified at room temperof a Vaportite Super Centrifuge asse[mbly] Centrifuge is equipped (on a common base) with feed and dis[charge] [bowl] for use either as a pumps, heater (optional), piping and co[nnections] [separ]ator. The same purifier may Heating is required for lubricating oil and be used for both fuel and lubricating oil.

TABLE OF SIZES

Size	Lubricating Oil Capacity Gallons Per Hour	Maximum B.H.P. of Engine to be used with	Fuel Oil Capacity Gallons Per Hour	Approximate Shipping Weight
11	15—25	300	15—25	300
12	50—100	1200	50—100	1050
13	75—150	1500	75—150	1100
14	150—250	3000	150—250	1200
15	200—300	4000	200—400	1750
16	250—450	7000	400—700	1850

Quotations will be supplied by Sharples Engineers on receipt of full information as to electric current, specifications, and engine sizes. The cost of Sharples engine protection is trivial compared to the benefits obtained.

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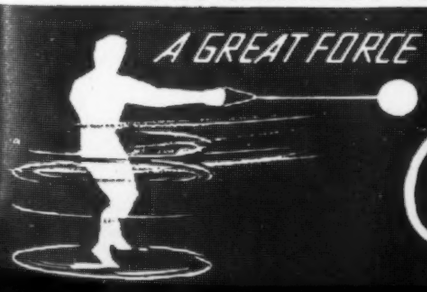

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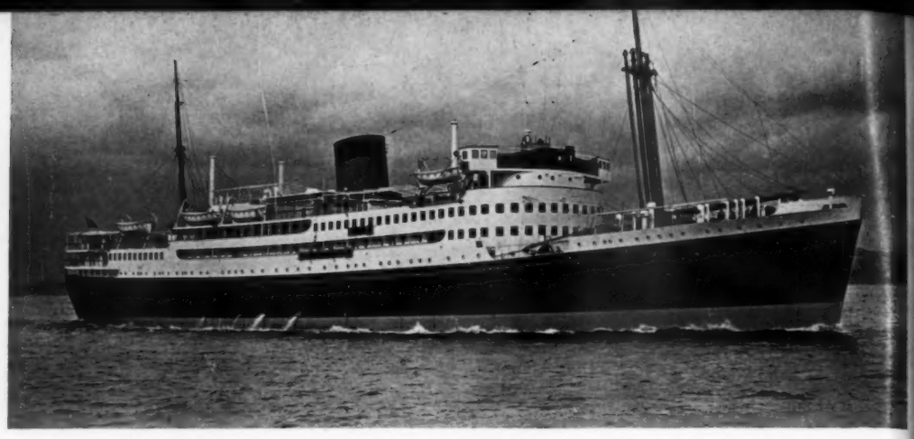

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After completion the "Royal Scotsman" was taken to Broomielaw pier, where she was thrown open to the public. In the course of a few days over 15,000 people had visited her and admired her glistening Diesel machinery.

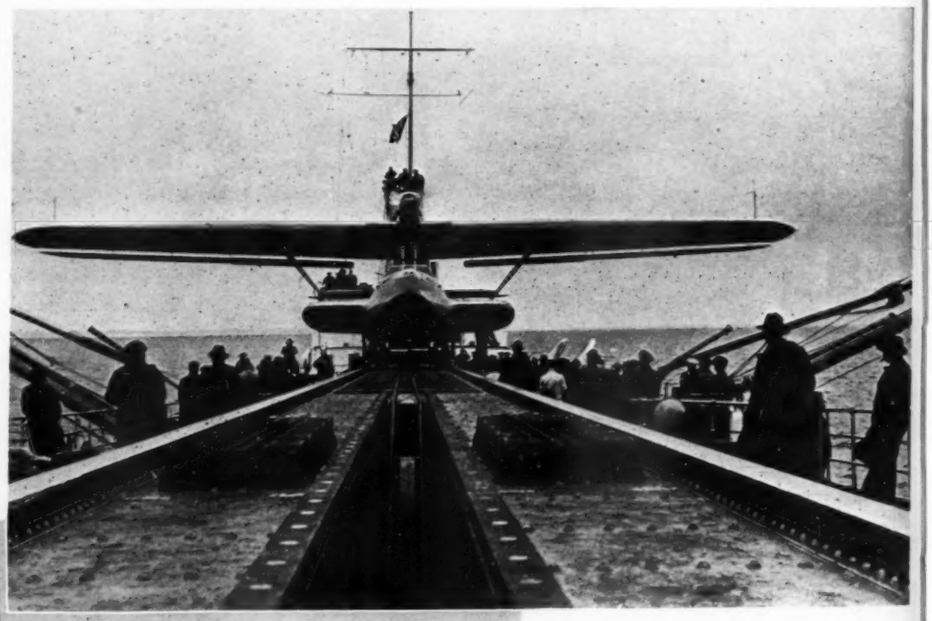
Abroad, most of the yards are occupied with new vessels of the tanker and cargo boat class, so that few really sensational launches may be expected for a month or two. One exception must, however, be made in the case of the new German seaplane base "Ostmark," intended for use on the South Atlantic air mail service.

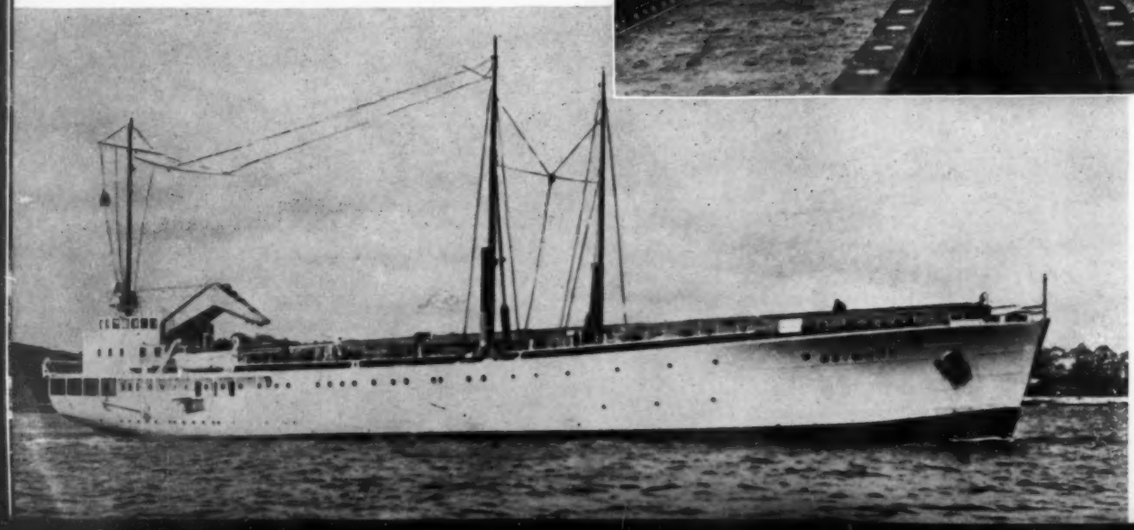
In order to carry the mail across the 1,960 odd miles of sea, a steamer, the *Westfalen*, was first utilized by the operators, the German Lufthansa, as a floating ocean base. Later, a second vessel was found necessary and the M.V. *Schwabenland* was, therefore, taken into commission. When the new 10-ton Dornier flying boats were put into service, equipped with Junkers Diesels, it was decided to modernize the base ships as well, and in accordance with the firm's plans the *Ostmark* was ordered.

The *Ostmark* was built by the Howaldtswerke A. G. of Kiel, and has a length of 245 ft., the beam being 37.6 ft. Two M.A.N. Diesels of 900 bhp. are fitted, and these give a speed of 14 knots. The engines are 10 cylinder units running at a speed of 310 rpm., the bore and stroke being 300 mm. and 420 mm. respectively. The two stroke cycle is used in conjunction with trunk-type pistons and Roots blowers. As will be seen from the accompanying illustrations, the engines are remarkably clean in appearance, and represent something distinctly unusual in marine engine design, the overall dimensions being some 20 per cent less than for normal units of this horsepower and type.

In contrast to the two earlier base ships which were merely conversions, the *Ostmark* has been planned specially for the job in hand, and carries full equipment for hauling seaplanes out of the water and launching them. (As a matter of interest, the *Ostmark's* catapult installation is capable of giving a boat weighing 15 tons a flying speed of 95 mph. before it leaves the ship). In addition, special attention has been given to the crew's quarters, the cabins having been made as large as pos-

. . . . *And now please turn to page 51*





M.S. "Ostmark" and the catapult for the Dornier flying boat, Do-18. Regular, "heavier than air," trans-Atlantic service with this type of equipment may be expected at an early date.

LET SHARPLES-PURIFIED OILS *Protect Your Engines*

FUEL OIL

Centrifugal purification of Diesel fuel oils permits the use of heavier, less expensive grades without operating difficulties.

LUBRICATING OIL

Centrifugal purification of lubricating oil reduces bearing wear, prevents clogging of the lubricating system, and reduces lubricating costs by saving oil.

SHARPLES EN BLOC OIL PURIFIER

The Sharples En Bloc Centrifugal Oil Purifier is a complete oil purifying plant. It consists of a Vaportite Super Centrifuge assembled (on a common base) with feed and discharge pumps, heater (optional), piping and controls. Heating is required for lubricating oil and heavy fuel oil, although the lighter grades of fuel oil may be purified at room temperature. The Super Centrifuge is equipped with a dual-purpose bowl for use either as a clarifier or separator. The same purifier may be used for both fuel and lubricating oil.

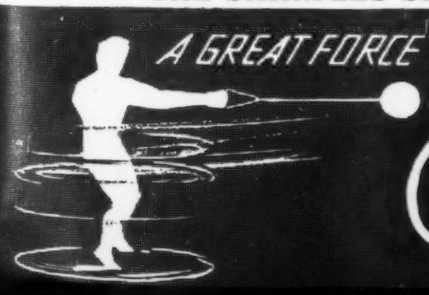
TABLE OF SIZES

Size	Lubricating Oil Capacity Gallons Per Hour	Maximum B.H.P. of Engine to be used with	Fuel Oil Capacity Gallons Per Hour	Approximate Shipping Weight
11	15—25	300	15—25	300
12	50—100	1200	50—100	1050
13	75—150	1500	75—150	1100
14	150—250	3000	150—250	1200
15	200—300	4000	200—400	1750
16	250—450	7000	400—700	1850

Quotations will be supplied by Sharples Engineers on receipt of full information as to electric current, specifications, and engine sizes. The cost of Sharples engine protection is trivial compared to the benefits obtained.

Give Your Engines the Protection They Deserve — Specify Sharples

THE SHARPLES SPECIALTY CO., 2304 WESTMORELAND ST., PHILA., PA.



SHARPLES
Centrifugal Engineers

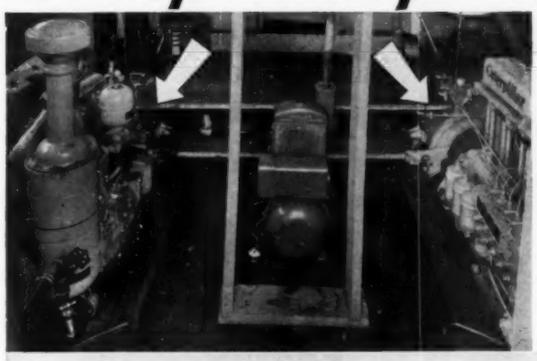
MARINE DIESEL POST OFFICE

THE only marine post office in the world is the Diesel vessel *O. F. Mook,* illustrated above, which serves in this capacity for the constantly passing parade of marine traffic on the busy Detroit River. While it may sound like something that the famous Mr. Ripley has dug up, it is a fact that more traffic goes through the Detroit River each year than through the Suez and Panama Canals combined. Obviously, such a situation provides a serious problem for Uncle Sam and his Post Office Department. The satisfactory solution has been found, however, in the new Diesel vessel which now delivers mail to both in and outbound vessels passing the City of the Straits.

The *O. F. Mook* was constructed during the past spring by the Defoe Boat and Motor Works of Bay City, Michigan. It is 65 feet long and 14 feet in width with welded steel hull, deck and houses. A six cylinder, 160 hp. Hercules-Kermath Diesel engine supplies propulsion power operating through a reduction gear with a Hill, 32 volt, DC auxiliary generating set supplying electric current. A complete hot water heating system is installed using an oil fired boiler and radiators in the pilot house and locker room forward. A Clarage blower heats the mail room which occupies the entire after section of the vessel. Although on a much smaller scale, this mail room is as completely fitted for postal work as any shore station. It contains five hundred standard size mail boxes and forty mail bins plus, of course, the customary sorting table and a desk. Complete provision has been made for twenty-four hour per day operation throughout the navigation season.

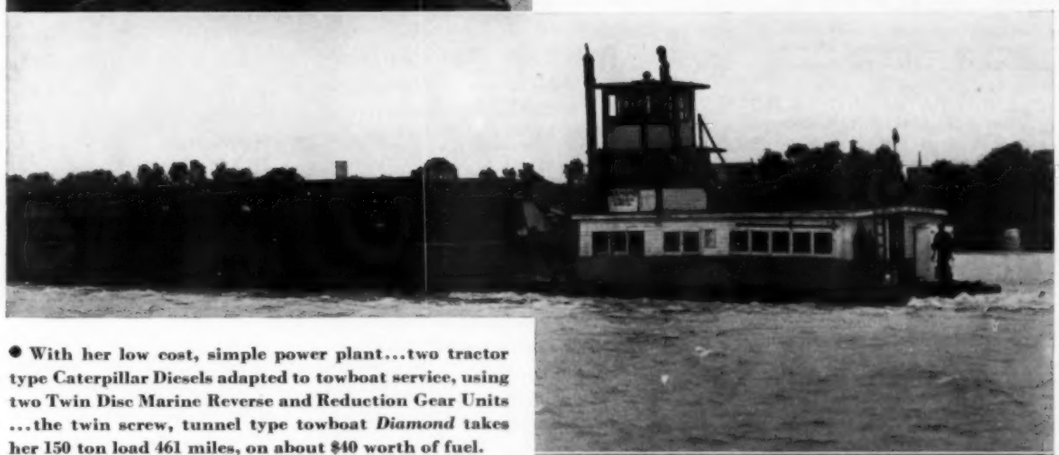
In addition to the well known Diesel advantages of economy, safety and dependability, what is perhaps even more important to the operation of this vessel is the greatly increased cruising range without refueling as compared with steam or gasoline power. This marine Diesel is truly worthy of the postal creed, "Neither rain nor snow nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds."

Simplicity...with Flexibility



TWIN DISC
MARINE REVERSE and REDUCTION GEARS..

Mississippi River towboat* Diamond *makes three round trips per month between Evansville, Ind., and Memphis, Tenn., hauling 100 automobiles on two 500-ton barges.

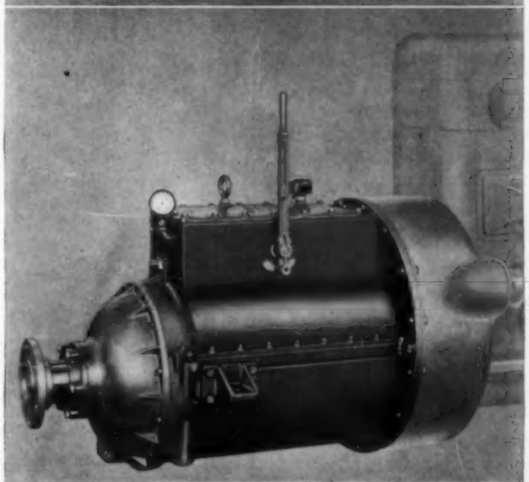


● **With her low cost, simple power plant...two tractor type Caterpillar Diesels adapted to towboat service, using two Twin Disc Marine Reverse and Reduction Gear Units ...the twin screw, tunnel type towboat *Diamond* takes her 150 ton load 461 miles, on about $40 worth of fuel.**

Each engine, a 6-cylinder D13000 Caterpillar Diesel, 120 hp. at 850 rpm, is directly connected to a MG-160 Twin Disc Reverse and Reduction Gear Unit. Reduction ratio between engine and propeller is 2 to 1 and thrust bearing is built with the gear assembly.

The adaptation of the standard Caterpillar engine for twin screw drive without alterations to valve gear affords a striking demonstration of the flexibility of the Twin Disc Marine Reverse and Reduction Gear Unit. Both engines revolve in the same direction, but the propellers run in opposite directions. The port propeller is operated through what would ordinarily be the astern clutch and gears in propelling the craft forward so that one of the Twin Disc Units is running continuously delivering full power and full speed in the reverse direction.

MG-160 "Series" Reverse and Reduction Gear Units are rated 160 hp. at 1200 rpm; standard gear ratios are 2:1 or 3:1. Bulletin 103 tells how this Twin Disc unit adapts any standard gasoline or Diesel engine for marine service. Write for it. *Twin Disc Clutch Company, 1345 Racine St., Racine, Wisconsin.*



TWIN DISC
CLUTCHES

THE PHENOMENA OF DIESEL ENGINE IGNITION AND COMBUSTION

By B. J. VON BONGART

"THE heat of the compressed air within the combustion chamber of a Diesel engine gasifies and ignites the injected fuel particles and thus begins a flame propagation ending with complete combustion of the fuel-air charge." These are the words of Diesel, the father of the compression-ignition (Diesel) engine.

While these more or less true facts were known — or assumed — by Diesel as well as by hundreds of his followers, yet for decades many of the Diesel fraternity labored under misconceptions as to the actual phenomena of ignition and flame propagation. It is only within very recent times that thorough scientific investigations have established indisputably just what happens within the combustion chamber of a Diesel engine.

Fuel Injection

In the modern solid-injection engine, fuel is forced into the combustion chamber by means of a jerk-pump under high pressure, the fuel being atomized mainly by the high pressure and partly by the particular type of injection nozzle used. A charge of atomized fuel is shown in Fig. 1.

Fig. 1. Atomized fuel, size 12 microns. (Magnified 70 times.)

The above test in fuel-atomization was made by Sass* and the constants used for this test were:

Fuel-pump speed (shaft and pistons) 90 rpm.
Nozzle opening 0.020 inch.
Injection pressure 4,060 lbs. per inch².
Compression pressure 147 lbs. per inch².

It will be observed that the fuel-droplets are not of equal size but range from 3 microns (1 micron = 0.0001 millimeter or 0.0004 inch) to 36 microns. Since the fuel-droplets are far from alike in size, it is customary to classify the droplets according to the size predominating. Thus the droplets of the illustration (Fig. 1) are designated as 12 micron droplets, the largest number, some 30% of the total, being of this size. Analyzing the various droplet sizes we find that

17% are of 3 micron size (smallest droplets)
30% " " 12 " " (predominating)
20% " " 16 " "
11% " " 20 " "
4% " " 30 " "
2% " " 36 " " (largest size)

the remaining 16% being intermediates between the sizes enumerated above.

The "ignition lag" encountered in all Diesel engines is directly dependent upon the fineness of the atomization — a sufficiently high compression temperature being assumed, of course — hence minute droplets or what is called a "fuel-fog" is desirable in that the ignition lag is reduced thereby. Of course, in actual practice, fuel droplets of much larger size are usual, and for large slow speed engines such fine atomization, while desirable, is not imperative.

Stream Formation

Having established the fineness of atomization by means of photography, Sass proceeded to photograph the fuel-stream as it leaves the injection nozzle. A number of experiments were made for which he simulated an engine's combustion chamber containing heated air under pressure and fitted with a quartz window so as to permit photographing. The result of one of these experiments is depicted in Fig. 2.

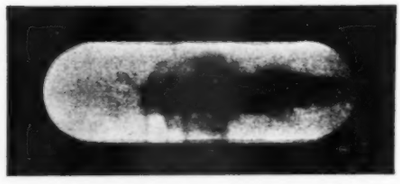


Fig. 2. Fuel-stream leaving nozzle.

The constants for the above test were:

Injection pressure 4,400 lbs. per inch².
Compression pressure 184 lbs. per inch².
Film exposure time 1 millionth of a second.

It will be noted that while the fuel is atomized, the minute droplets travel in close proximity to one another, much closer, for example, than buck-shot, when leaving the gun barrel. Also, the air surrounding the fuel-stream is agitated

*F. Sass, Chief Engineer, A.E.G.

in a manner comparable to the turbulence caused by a high power projectile (rifle bullet). It can clearly be seen that the stream does not travel evenly; the center moves faster and the sides of the stream are retarded considerably, due, unequestionably, to air-friction.

Fuel Stream Velocity

The velocity of fuel streams was determined by Sass by means of motion picture films, a typical result being shown in Fig. 3.

Fig. 3. Fuel-stream velocity.

The constants for this particular test were:
Injection pressure 4,400 lbs. per inch².
Compression pressure 220 lbs. per inch².
Film exposures times 1½ thousandths of a second apart.

The fuel injection begins with the first picture and is practically completed with the ninth picture. Clearly visible are the two brass wires used for measuring the fuel stream, and the (central) glass tube by means of which compressed air was injected so as to avoid the formation of a fog which would hamper photographing the fuel-stream in all its details.

Measuring the fuel-stream with the aid of the known time factor of exposure intervals, it was found that the initial velocity averaged 450 to 550 feet per second, but was reduced very rapidly, so that after a time interval of but 1 thousandth of a second, the velocity was reduced to from 180 to 215 feet per second and after but 0.002 second was reduced to only 90 feet per second. The fuel stream at this moment had penetrated the chamber to a depth of 4 inches.

Ignition and Combustion

The self-ignition and flame propagation were thoroughly investigated by Holfelder*, who made use of similar arrangements, i.e., simulating an engine's combustion chamber and photographing the phenomena through a quartz window. Over 200 tests were conducted by him, producing a wealth of authentic data heretofore unavailable. A typical test is shown in Fig. 4.

The constants for the above test were:
Amount of fuel injected 0.012 cubic inch.
Injection pressure 4,410 lbs. per inch².
Compression pressure 352 lbs. per inch².
Compression temperature 968° F.
Weight of air charge 0.64 lb. per foot³.
Ignition delay 0.0075 second.
Exposure velocity, 390 pictures per second.

*Dr. O. Holfelder, VDI. No. 374, 1935.

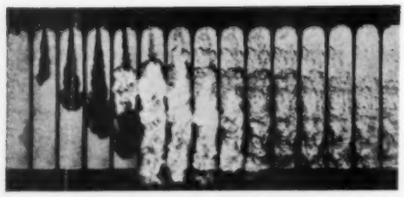


Fig. 4. Ignition and flame propagation.

Injection begins with the first picture and is continuous throughout up to the sixth picture. Ignition sets in at the fifth picture, beginning approximately within the middle of the fuel-stream, there being no indication of any gasifying process taking place. Flame propagation begins with the sixth picture, the flame forming towards the combustion chamber proper. With the seventh picture the flame also eats its way towards the fuel nozzle, and as indicated by the eighth and ninth pictures, the dribblings (most nozzles dribble to a greater or less extent) are quickly consumed by the combustion.

Analyzing the photographic recordings, we find that the flame propagation (during this particular test) is violent on account of the lack of sufficient air (the weight of the air-charge being but 0.64 lb. per cubic foot), and the comparatively great ignition-delay of 0.0075 second is unquestionably due to the low density of the air charge – the compression pressure being but 352 lbs. per square inch.

For decades not only Diesel but others also asseverated that the fuel must be "gasified" before ignition could possibly set in, some holding this view to this very day. We know now that the heat inherent in the highly compressed air causes a rapid oxidation of the minute fuel-droplets; this very oxidation generates heat, which, given off to the surrounding air (oxygen), heats the latter still more and, in turn, accelerates the process of oxidation until a visible flame is formed! And once there is an open flame, combustion of the entire fuel-air charge is accomplished within the time of but a fraction of a second.

Furthermore, extensive tests have proved that the whole of a fuel-droplet, minute as it is (see Fig. 1), need not and does not ignite at once. The outer fringes of the droplet, in contact with the oxygen molecules of the surrounding air, ignite; the heat thus generated acts upon the remainder of the droplet and the air, and the commotion caused by the combustion brings more fuel-droplets in contact with oxygen molecules, thus accelerating the combustion process.

When one realizes that a gas requires a higher temperature for auto-ignition than a liquid (Diesel oil), and that the latter in turn requires a higher temperature than a solid, such as coal dust, flour, etc., it becomes evident that all attempts to pre-heat the fuel as an aid in gasification and hence for "quicker" combustion are futile.

The gasifying of the comparatively heavy Diesel fuel-oil – in contrast to the light and highly volatile liquids such as gasoline, benzin or ether – would require a time lag, making Diesel engine speeds of 3,000 rpm. (engine speeds up to 4,000 rpm. have been reached in laboratory tests) simply impossible.

Oxidation takes place at ordinary (atmospheric) pressure and at ordinary (room or open-air) temperatures, but such oxidation is known as cold combustion since no flame forms and no appreciable heat is being generated. At high pressures and consequently high temperatures, the oxidizing process, i.e., combustion, generates heat and this heat is the power developed by Diesel as well as by all other internal combustion engines.

LONDON LETTER No. 11

. . . . *Continued from page 44* . . . .

sible, and furnished in modern style. For the crew's entertainment loudspeakers are installed in the dining room and lounge, a sound film plant and an excellent library also being provided.

(Editor's Note: The *Ostmark* was fully described on pages 34 and 35 of the September issue of DIESEL PROGRESS. Mr. Wilkinson's aviation article elsewhere in this issue deals further with this subject.)

In the course of the last twelve months a number of important modernization schemes have been completed on motorships which have become obsolete — usually for reasons of speed. One such conversion was finished in the early part of this year on the Cosulich liner *Vulcania*. Originally, the *Vulcania* was fitted with four stroke double acting machinery giving her an average speed of about 17½ knots. In the winter of 1935, however, her owners decided that for a liner of 20,000 tons, 17½ knots was too slow, and she was returned to the Monfalcone Yards of the Cantieri Riuniti dell' Adriatico to be re-engined with Fiat double acting two stroke machinery of 26,000 nominal bhp.

The new engines are the second largest Diesel units afloat today, and although designed for an output of 13,000 bhp., on trial they were found to develop over 17,650 bhp. each without undue overloading. At 18,000 bhp. the B.M.E.P. registered was about 77 lbs. per square in., with a piston speed of 1,200 ft. per minute, and during the official demonstrations a fuel consumption of 1.37 lbs. per bhp. hour, including the auxiliary scavenging set, was recorded. The consumption figure for a steamer of corresponding size, fitted with the very latest steam generating installation, would be between .6 and .75 lbs. per bhp.-hour, so that the *Vulcania's* machinery shows a 100 per cent fuel saving over the equivalent steam plant.

Last December the sea trials were carried out at Trieste, the ship displacing 23,000 tons. The measured mile was covered at an average speed of 22.39 knots, the actual maximum being well over 23 knots. In service 20.5 knots has been maintained with ease, that is about 3 knots more than before the modifications.

Two other interesting conversions have just been completed on the Messageries Maritimes passenger liners *Felix Roussel* and *Aramis* by the Compagnie de Construction Mécanique Procédes Sulzer. In this case speed was again the governing factor, the original two stroke single acting air injection, twin screw machinery of 11,000 bhp. giving a maximum of only 16½ knots at a propeller speed of 110 rpm.

The length of the vessels is approximately the same (566 ft.), the displacement being 20,945 tons.

After a number of preliminary calculations had been made Sulzers found that to raise the speed to the required 18½ knots the power output would have to be increased to 14,700 bhp. at 120 rpm., or a step up of some 30 per cent. For this purpose a special Sulzer pressure-charging system was adopted, solid injection taking the place of the old air arrangement. A few weeks ago, when the trials were carried out, it was found that whilst the specified power output had been bettered by more than 600 bhp., the fuel consumption showed a 10 per cent drop, thus proving conclusively the better efficiency of the blown solid injection engine.

PENELAS MINE

. . . . *Continued from page 37* . . . .

starting load on the generator of over 200 amps., but no appreciable drop in voltage is apparent.

Dorr Duplex Classifier . . . . 7.5 hp.
5′ by 5′ Denver ball mill . . . 50.0 hp.

The following load is on for 16 hours per day:

Ore conveyor . . . . . 7.5 hp.
6″ by 20″ jaw crusher. . . . . 15.0 hp.

•

Although designed as a 40-ton mill, 48 tons per day are being milled at present. The ore and waste bins at the mine head are of 90 tons capacity each. The ore passes from the bin through a bar grizzly to the 20″ by 6″ jaw crusher; thence up a 16″ belt conveyor to the fine ore bin of 60 tons capacity at the mill head. From the fine ore bin the ore is self-feeding into a 5′ by 5′ Denver ball mill grinding in the vicinity of 70 per cent minus 200 mesh in a two to three pounds per ton cyanide solution. A 4′ 6″ by 18′ Dorr duplex classifier is used, from which the pulp is carried by a bucket elevator into a system of thickeners and air lift agitators wherein the pulp is in contact with the solutions for approximately seventy-two hours.

The Merrill-Crowe zinc dust precipitation process is used, and a fairly high recovery of 97 per cent of gold and slightly less of silver is reported. Solution tails, following precipitation, are 1¢ per ton of solution.

The filter is a 12′ by 10′ Portland type on which is maintained a vacuum of about 17 inches. The moisture content of the tailings runs near 30 per cent. The filter is sprayed with hot water from the Diesel-electric plant, this being an experiment to see if greater silver recoveries are possible by using warmer solutions. A system of heat exchangers is being worked out to utilize more of the waste heat from the power plant, a feature which will be a substantial saving particularly in zero weather.

In the proposed system the Diesel plant takes its cooling water by gravity from a 12,000-gallon fresh water reserve tank on the top deck of the mill. The water, heated in circulating the Diesel engine, is pumped back up into the mill and through a system of coils in the stock and barren solution tanks and thence to the reserve tank again. This method of recovering waste heat together with the already high thermal efficiency of the Diesel engine should make for extremely low milling costs per ton. If the mill was driven by a steam plant or electricity from any other source than the Diesel engine, other and more expensive means of heating the solution in cold weather would have to be made.

No figures are available as to milling costs, but under actual test the engine pulled its full load of 100 kw. with a fuel consumption of 7 gallons per hour and 1 gallon of lubricating oil in 24 hours. With fuel laid down at the mine for 8¢ per gallon and lubricating oil at 50¢, this brings the actual operating cost to a fraction less than .6¢ per kw. hour.

In the photographs which were taken by the author during the construction of the mill the 90-ton ore and waste bins are not shown. The head frame is the temporary structure used during development work.

In connection with this article on the Penelas Mine, attention of our readers may well be drawn at this time to the *Diesel Application Planbook* which is now ready to mail. In this unique book will be found a number of Diesel plant layouts which have solved many mine owners' problems just as this Atlas Diesel installation has solved the Penelas Mine problem.

DAVID DASSO

JUST as we were closing for press came the news that Robert B. McColl, who has headed up the McIntosh & Seymour Corporation division of American Locomotive Works since 1931, has resigned and has moved over to become president of Alco Products, Inc., another division of Alco.

David Dasso now heads the Diesel Division of American Locomotive Company, as Vice-President of Alco, Diesel Division. Only recently McIntosh & Seymour Corporation was absorbed completely into the parent company, its name dropped and in future the Diesel activities of Alco will be carried on as indicated above – as the Diesel division of Alco.

David Dasso brings to Alco and to the American Diesel industry a rich background of experience, as an executive, as a salesman, as an engineer. Born in Lima, Peru, in 1891, a graduate of Massachusetts Institute of Technology, he engaged in active business in Peru until around 1931, devoting much of his time in those years to the sale and installation of Diesel engines in Peru.

In 1932 he came to New York as the representative of Sulzer Brothers of Winterthur, Switzerland, whom he had represented previously in Peru. In this connection he negotiated an arrangement between American Locomotive Company and Sulzer Brothers whereby Alco now has a license to build certain types of Sulzer Diesels in this country.

For over a year he has been away from New York. Now he is back here to take up new duties – our best wishes go out to him and to Alco – he is a good man, well fitted for the job.

LUKENWELD ELECTS CHAPMAN PRESIDENT

Robert J. Whiting Made Vice-President

EVERETT CHAPMAN, who has been vice-president of Lukenweld, Inc., Coatesville, Pa., has been elected president of the company, according to an announcement by Robert W. Wolcott, president of Lukens Steel Company, of which the Lukenweld organization is a division. Chapman succeeds G. Donald Spackman, who was recently promoted to general superintendent of Lukens Steel Company.

Robert J. Whiting, who has been superintendent of Lukenweld, Inc., in charge of all manufacturing, has been elected vice-president of Lukenweld, Inc.

Chapman was born in Detroit on May 9th, 1901, attended grade school and high school there and was later employed by the Detroit Testing Laboratories. In 1919 he entered the University of Michigan and was graduated in 1923 with a degree of bachelor of science in electrical engineering. He pursued a year's graduate work in physics, his senior thesis covering electrical vibration of high frequencies and gaining him the degree of master of science. He then became instructor in electrical engineering at Purdue University.

In 1925, Chapman joined the Lincoln Electric Company, Cleveland, as experimental engineer. Here he was responsible for the development of the "electric tornado" system of automatic arc welding, electric control apparatus for motors and general work on arc welding.

In 1930 he joined Lukenweld as director of development and research and was elected vice-president of the company early in 1934, in which capacity he served until he was elected president.

Robert J. Whiting, vice-president of Lukenweld, was born in 1885 at Foster, Pa., and attended grade school, high school and business college in Scranton. His first work was with the Keller Manufacturing Company, Scranton vehicle manufacturers, which he joined in 1906.

MR. EVERETT CHAPMAN

In 1909, Whiting entered the employ of Pickering Enginering Company, Hartford, Conn., where he remained for four years, engaged principally in problems of structural design concerned with power plant equipment.

In 1913, Whiting became master mechanic on plant equipment for the Ford Motor Company, Detroit, Mich., later being promoted to superintendent of body construction at the Ford plant. During the war, Whiting was in charge of the force of 8,000 men employed at the Ford Motor Company for the construction of boats for the United States Navy.

In 1923, Whiting became production engineer for the Fisher Body Corporation and supervised the erection of body plants and equipment at many points throughout the country. As manager of Fisher's Flint, Mich., unit No. 1, for a period of four and one-half years, Whiting was in charge of engineering and construction of the largest body building plant in the country, employing 10,000 men.

In May, 1934, Whiting resigned from Fisher Body Corporation and joined Lukenweld, Inc., as superintendent, which position he held until elected vice-president of the organization. Whiting will continue in charge of all phases of manufacture at Lukenweld, Inc.

AIR PROGRESS

. . . *Continued from page 35* . . .

if a Diesel-operated airline from Germany to South America, as well as to North America, will soon be an accomplished fact.

The *Buckeberg*, piloted by Capt. Unticht, left Dessau on the night of August 22, and arrived at Bathurst on August 23, about 20 hours later. Being a mailplane, it carried a crew of three, and was equipped with special tanks holding 1,175 gallons of Diesel fuel. At a flying weight of 21,600 lbs., it required a run of 1,500 ft. for the take-off, which was accomplished in 23 seconds. Most of the flying was done at an altitude of 6,000 to 7,000 ft., and the average speed for the distance of 3,600 miles, was 180 mph. When the plane landed, 330 gallons of fuel remained in the tanks – sufficient for a flight of over 7½ hours, or 1,400 miles. The fuel consumption for each of the 600 hp. Junkers *Jumo 205-C* engines was 21 gallons, or 152 lbs., per hour.

As has been mentioned in previous articles in DIESEL PROGRESS, the Junkers *Ju 86* has also been finding favor on airlines outside Germany. Swissair has found the Diesel engine very satisfactory for night flying, and other airlines are considering similar equipment. At the recent International Aero Exhibition at Stockholm, the King of Sweden and his staff were greatly interested in one of these planes, which had been flown over from Dessau by Capt. Zimmerman, chief pilot of the Junkers factory.

Although most of the Diesel activity has been by German planes, at least one other country in Europe has been making excellent progress. The latest news from France is that the C.L.M. Diesel engine has successfully passed its 50-hour tests, and two of them are being installed in a Bernard *82* long-range bomber. This plane will be used in the competition for the French Air Ministry prize of 10,000,000 francs ($660,000) for the Diesel-engine plane of French manufacture which beats the World's non-stop, non-refuelling record for 10,000 km. (6,200 miles) before December 31, 1936.

In summing up the "Air Progress" of the Diesel engine during the past twelve months, it is seen that actually there has been a good deal of activity, accompanied by some very noteworthy achievements over land and sea. These achievements, however, belong to other countries. In the United States, we have made practically no contribution to this progress, with the possible exception of supplying Diesel fuel and landing facilities to the craft of another country, and having the satisfaction of knowing that American propellers, manufactured abroad under license, have been used on some of these flights. It is to be hoped that when the time for the review of "Air Progress" comes around next year, that the United States will then have some real achievements to report in the Diesel field.

DIESEL YARN MILL

. . . . *Continued from page 28* . . . .

hosiery and the balance of the output of this mill is used for making ladies' fancy knit and woven goods.

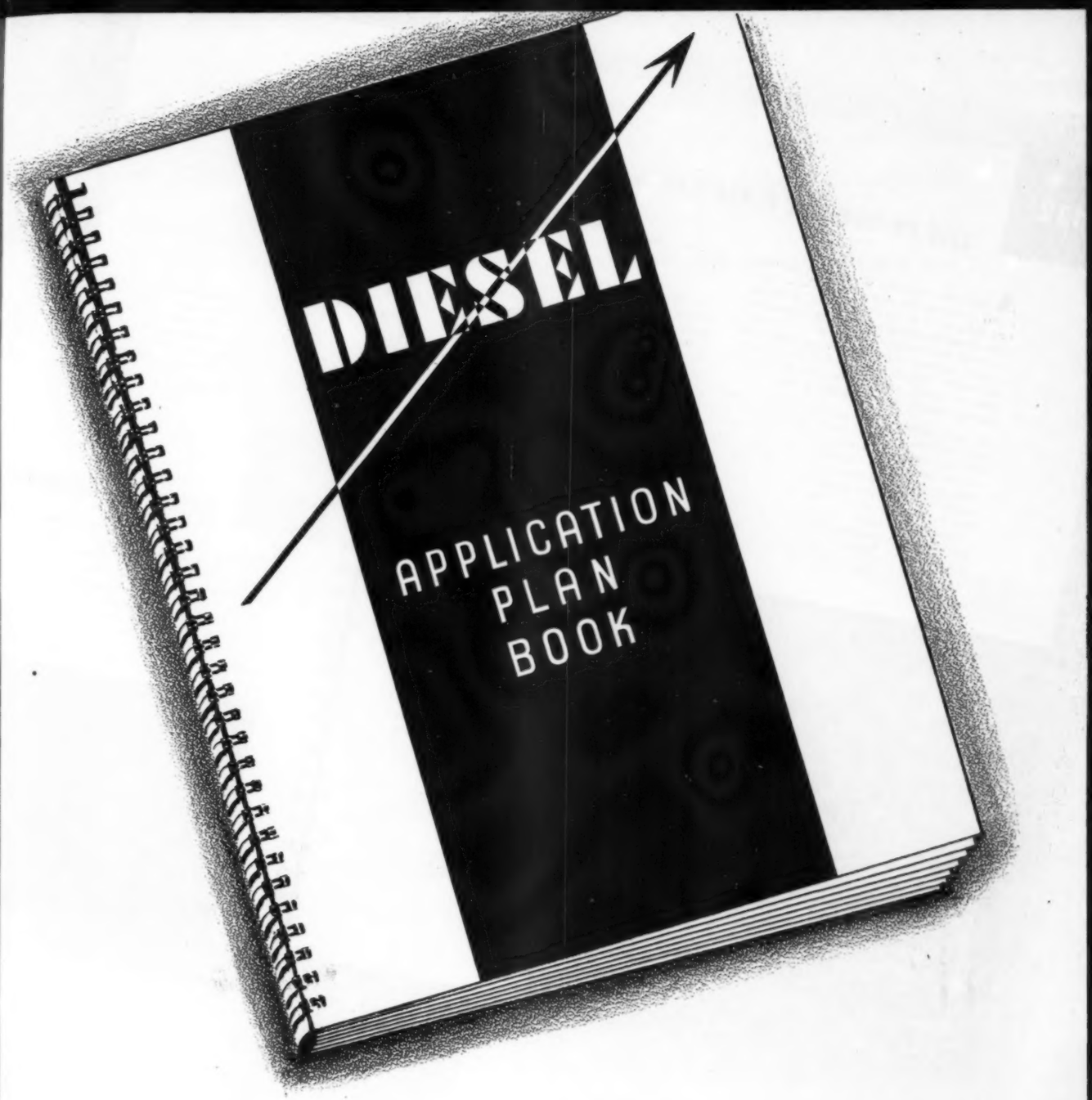
The latest additions to the production capacity of this plant indicated the immediate need for more power, and consistent with the policies of modernization and efficient management, a careful study was made to determine the type of equipment which should be installed. Past experience with Diesel power had clearly demonstrated the advantages of this type of power and a Superior Diesel engine of 810 hp., manufactured by The National-Superior Company of Springfield, Ohio, was purchased. It was direct connected to a 550 volt, 60 cycle, 3 phase AC generator which was already on hand. This being of the belted type, some alterations were necessary to adapt it for direct connection to the engine through a flexible coupling. This unit furnishes regular power service for the entire mill, including lights in the village. The old Diesel unit is used for reserve. Both of the Diesel generating units as well as the hydro-electric unit can be paralleled if desired.

In the absence of a railroad at Saxapahaw, it was necessary to truck the engine in for a distance of about 13 miles. Although road conditions were far from ideal following the severe period of floods which swept the country this spring, this relatively large engine was handled without dismantling and without serious difficulty.

It may be stated that very uniform speed is necessary to maintain the uniform quality of fine hosiery and weaving yarns. The close regulation of the Superior Diesel under varying load conditions meets this demand very successfully. It is noteworthy that a fire pump with 125 hp. motor may be started with 750 hp. load already on the engines, without any difficulty or without any flicker in the lights.

At present, the engine is running twenty-four hours per day, six days per week, at approximately 750 hp. load, under which condition it consumes about 31 gallons of fuel per hour. Lubricating oil consumption averages 3,600 bhp. hours per gallon. Records kept to date indicate that power cost is five mills per kwh., including fuel, lubricating oil, labor and maintenance. It is necessary to haul fuel from Wilmington by truck.

As this plant is located in a rather secluded spot, no exhaust silencer is used. The noise from exhaust discharged through a rather long tail pipe is not at all objectionable.



ANNOUNCING A New Book on Diesel Applications. Three Hundred and Twenty Pages of Plans Depicting Hundreds of Successful Diesel Applications—A Remarkable Book in Which Has Been Gathered Together the Experience, The Know-how of an Entire Industry. Each Plan Described in Detail. The Problems Met and Solved Fully Described. →

132

2500 KW MUNICIPAL POWER PLANT Designs by W. R. Halway

A GROWING municipality of some 10,000 population decided to build its own power plant. Previously, electric lights and power for the city and its residents had been furnished by high line from the utility operating in that vicinity. The project was, therefore, a new one without restrictions as to existing machinery or buildings or size and shape of land plot available. The city naturally took much pride in the plant and resolved to have a modern and efficient plant housed in a building of which they could be proud.

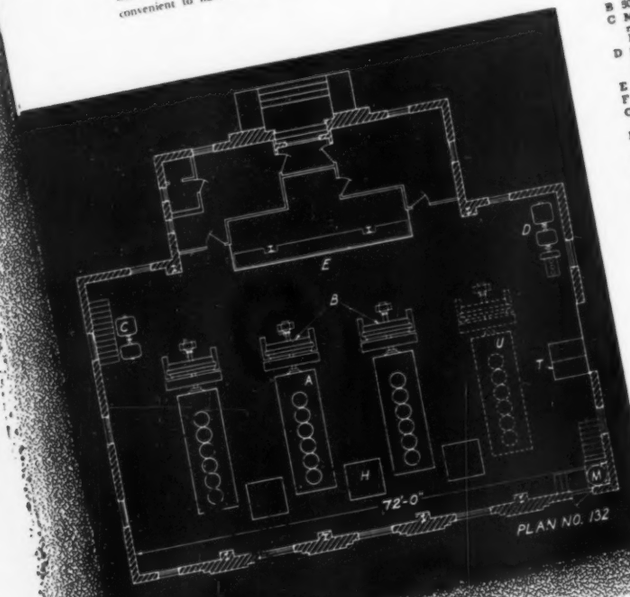
The initial installation was of three 500 kw units. The future fourth unit is to be of twice this individual size, or of 1,000 kw. This gives great flexibility to meet the varying load conditions found in municipal service—a light load during the early morning hours, a moderate load during the daytime, with a heavy peak load during the evening hours. With several units in the station, the number of them in operation can be varied to carry the load and at the same time keep those operating loaded efficiently. And it is very convenient to have one large unit, as there will be when the station is complete, which is much larger in capacity than the others. It can carry a heavy portion of the burden of the peak load.

Furthermore, any engine in the station can be shut down for many hours a day without interfering in any way with having plenty of capacity of equipment available to handle the load. This gives ample time to do all necessary inspection and maintenance work, or to make urgent repairs in case of an accident.

The machinery arrangement adopted for this station is simple and gives excellent light and ventilation, and easy accessibility to every piece of equipment. The location of many of the accessories in the basement clears the main engine room floor of these items and also of the piping which goes with them. The overhead crane reaches everything on the main floor. The exhaust gas waste heat boilers G are reached by lifting the concrete slabs H, and the other items in the basement can be trucked or skidded over under the access door T.

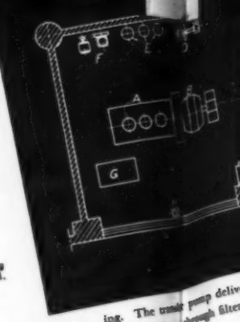
Legend

A Six cylinder 750 hp. 225 rpm. Diesel engine
B 500 kw generator
C Motor generator exciter set—50 hp. motor, 30 kw., 125 volt generator, 1800 rpm.
D Same as C with addition of 80 hp. gasoline engine connected through centrifugal clutch for emergency use
E Switchboard
F Electrical transformers
G Waste heat boiler—runs wet or dry and also acts as muffler
H 2 ft. 6 in. square removable concrete slab in floor for access to boiler
I Lubricating oil centrifugal purifier
J Fuel oil centrifugal purifier
K Fuel oil transfer pumps
L Fuel oil pump
M 200 gallon fuel oil day tank
N 2000 gallon clean fuel oil storage tank
O 300 gpm. centrifugal raw water pump—5 hp. motor
P 400 gpm. centrifugal soft water pump—7½ hp. motor
Q Starting air compressor
R Starting air tanks
S 5 ton hand operated crane and trolley
T 5 ft. 6 in. square access opening in floor covered by steel doors
U Future engine unit of 1500 hp. or 1000 kw.
V 750 gallon lubricating oil tank
W Diesel engine foundation
X Air intake filter housing



Legend

A Three cylinder 170 hp. 300 rpm. Diesel engine
B 120 kw direct current generator
C Switchboard
D 6 hp. gasoline engine driven starting air compressor
E 18 in. by 6 ft. starting air tanks
F 5 hp. motor driven starting air compressor
G 200 gallon fuel oil day tank
H Fuel oil filter
I Lubricating oil filter
J Motor driven centrifugal cooling water pump—70 gpm., 100 ft. head. 1950 rpm.



indicates the level of the water in the roof tank on a chart in the engine room, by a low water level alarm, by sight flow indicators and alarms on the water outlet for each engine, and by thermometers on the inlet and outlet of each engine. The hot outlet water from the engines is also circulated in the building hot water system used for showers and washing.

Fuel storage is in a 12,000-gallon tank outside of the build-

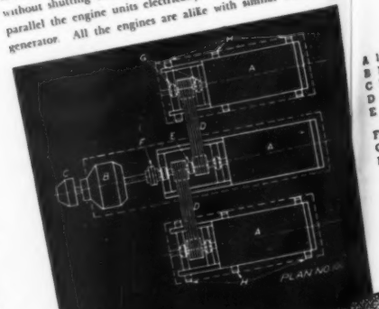
ing. The transfer pump delivers day tank, through filter

Each engine has its own indicating pump mounted on the engine plate sump oil delivers it to pump delivers a part of the gravity tank on the engine

100

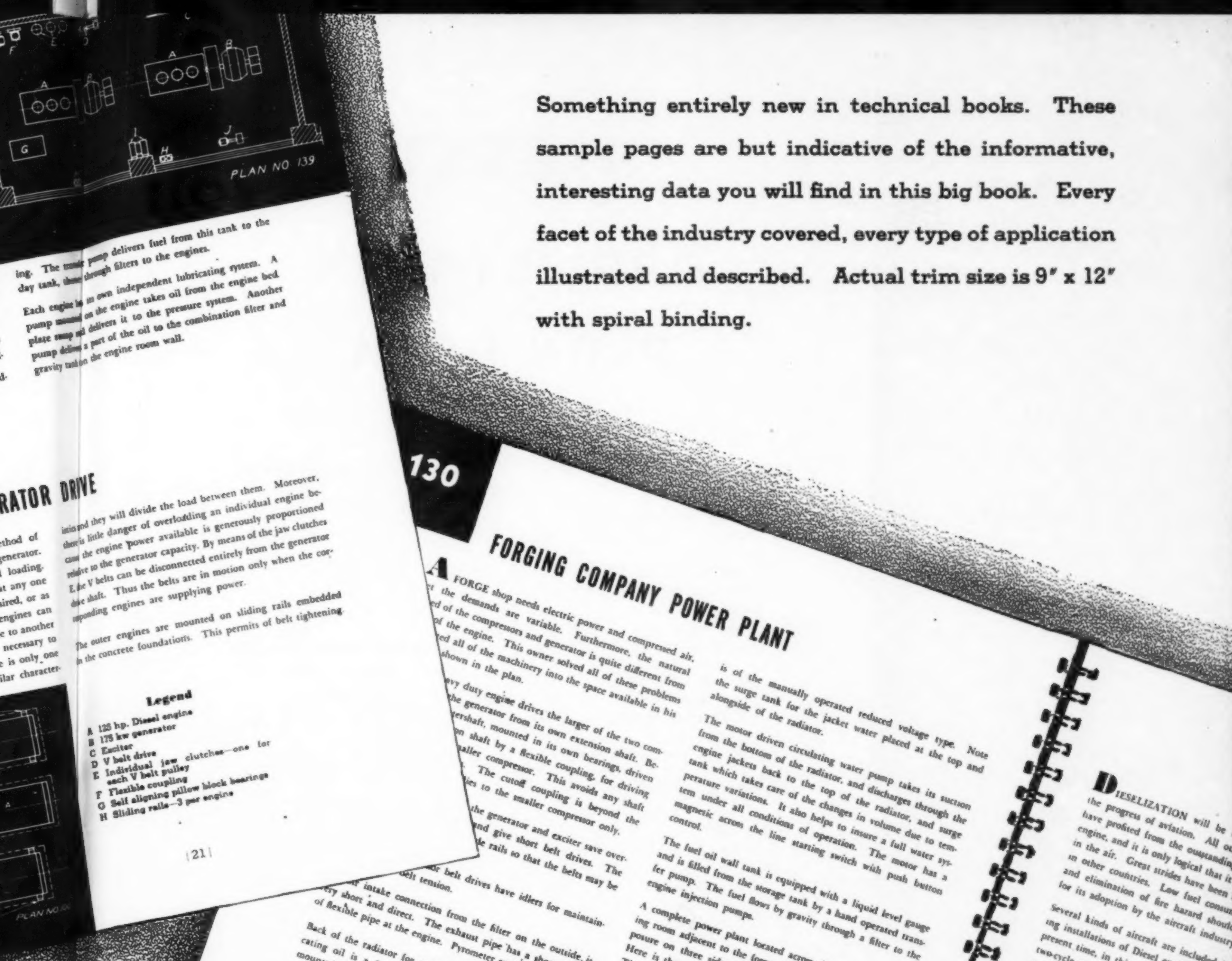
THREE UNIT GENERATOR DRIVE

THIS layout shows a practical and efficient method of combining the power of three engines to drive one generator. It offers great flexibility in engine operation and loading. Each engine unit has its own friction clutch, so that any one or two engines or all three can be operated as desired, or as found necessary to carry the load. Any of the engines can be started or stopped, or the load shifted from one to another without shutting down the generator. It is not necessary to parallel the engine units electrically, since there is only one generator. All the engines are alike with similar character-



In these three hundred and twenty pages you will find marine, industrial, transportation and aviation applications of the Diesel engine, all in blue print form. It is our hope to provide in this book at least one plan, one application, which will approximate your power requirements, so that you may visualize how easily and efficiently a Diesel application may be worked out to solve your own specific problem.

Something entirely new in technical books. These sample pages are but indicative of the informative, interesting data you will find in this big book. Every facet of the industry covered, every type of application illustrated and described. Actual trim size is 9" x 12" with spiral binding.



DIESEL APPLICATION PLAN BOOK

CONTENTS

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THE DIESEL APPLICATION PLAN BOOK

A Review

Editor John W. Anderson, New York: 9 inches by 12 inches. 320 pages. Price $5.00. Published by Diesel Engines, Inc., 2 West 45th St., New York City.

A BOOK on any technical subject which appeals to engineers and the public alike is rare. A Diesel book which is of use and interest to executives, engineers and salesmen of that industry and has equal or greater value for the power-using public, is a distinct achievement. Such a volume is the DIESEL APPLICATION PLAN BOOK which intelligently presents machinery layouts in blue-print form with specific discussion and legends, general text relative to selection, installation and operation of Diesels, and comprehensive Check Lists. The thoroughness with which this book deals with the problems of using Diesels economically is exceeded only by its infinite variety, the subject matter running the entire gamut from 2½ kw. residential Diesel generating sets to large municipal plants of 45,000. No one with a power problem can fail to find an answer to his problem among the 253 plans, whether it be Industrial, Marine or Transportation. Paradoxical though it may sound, the DIESEL APPLICATION PLAN BOOK is a bird's-eye view of a great industry, which actually gets down to brass tacks.

PHILADELPHIA, Sept. 30. — Light-weight stainless steel buses built on the principle of streamlined trains are to be placed in service over the Syrian desert.

The Edward G. Budd Manufacturing Company, builder of light-weight trains, announced today the receipt of an order from the Nairn Transport Co., Ltd., for two stainless steel bus trailers, the first of their kind, for service between Bagdad, in the British mandated territory of Iraq, and Damascus, Syria. Drawn by 150 hp. Diesel tractors, to be built by the Van Dorn Iron Works, of Cleveland, Ohio, they will make the 530-mile run over open desert in 15 hours; heavy buses now require 35 hours.

SURVEY SHIP

. . . . *Continued from page 38* . . . .

large Kelvinator icebox, a Buell oil-fired range and stainless steel sink and worktable and tile flooring. Next aft is the engine trunk, the upper half of the engine room followed by a Supervisors room and Captains room, with two showers and lavatory, and a roomy saloon on the after end. The chart room is used also for drafting by the survey crew. Davits for two small boats are fitted, and plenty of room is available.

A Sperry electro-mechanical steering gear is fitted as well as remote control stand for the propulsion motor.

The most interesting feature of this husky ship is naturally her elaborate power plant. The main generator sets are of 360 hp. turning at a maximum of 450 rpm. and a product of the Enterprise Engine Company of San Francisco, California. These new Diesels are of the four-cycle, non-reversing, trunk piston, common-rail injection type, having cylinders cast enbloc and of a greatly reduced weight over previous models. Each of these two Diesels turn a 225 kw. DC Westinghouse generator and a 20 kw. exciter, used also for battery charging and excitation of the main propulsion motor. A feature of the layout permits operation of the propulsion motor with either or both main generating sets and the switching of the auxiliary load to either exciter generator or onto the 20 kw. auxiliary Diesel generating set.

An elaborate switchboard, installed by Westinghouse, controls all electric circuits aboard the ship. Each main Diesel generating set runs at constant speed, its load being varied by the load on the corresponding generator output, which in turn controls the sensitive fuel injection governor control. Two Weston tachometers indicate engine speed.

On tests the ship developed 11.275 knots with a propeller speed of 280 rpm. thus easily making her a 11½-knot boat at full speed.

Idling down to a speed of 60 rpm. on the propeller, she ran nearly 3 knots and it is possible to operate her at 8 knots with but one generating set in operation.

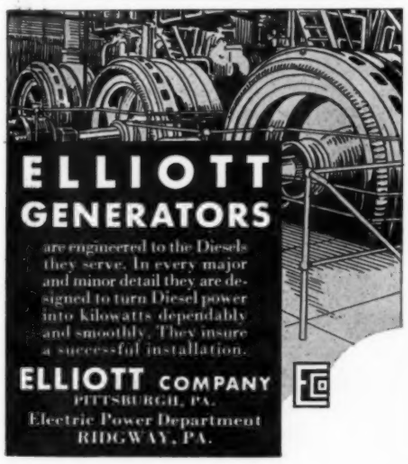
A 30 hp. 4-cylinder, 4-cycle Atimco Diesel auxiliary generating set, with the engine made by Atlas Diesel Engine Company and generator by Westinghouse, provides auxiliary current for battery charging, deck windlass, Rix auxiliary air compressor, etc. The Edison alkaline battery is used aboard this vessel for auxiliary lighting and starting up after a long shutdown. The air compressor is driven by a 10 hp. Westinghouse motor and a Nash fire-bilge pump by a motor of like size and make. The Fairbanks-Morse line of small pumps for fuel oil transfer, fresh water, lubricating oil and sanitary circuits is supplied. Lubricating oil is purified with a Sharples centrifuge.

The *Robert Gray* was built at the Lake Washington Shipyard at Houghton, Washington, on the Eastern shore of the lake, near Seattle. She was designed by O. A. Seigley, of the Engineers office in Portland, with W. C. Nickum, prominent Northwest architect representing the builders.

She is the last word in this type of vessel and will base at Portland, Oregon, permanently.

OMISSION

IN the article on pages twenty-six and twenty-seven of our September issue, describing the 2,000 hp. Busch-Sulzer Diesel engine installed in the Illinois Central Transfer Locomotive, we failed to notate that a Thomas Single Engagement Flexible Coupling was installed between the engine and generator. It has been found necessary, in Diesel Electric locomotive construction, to place a flexible coupling between engine and generator and the type "S" Thomas Coupling has been and is being used in a majority of such installations.



DIESEL PROGRESS

INDEX OF ADVERTISERS

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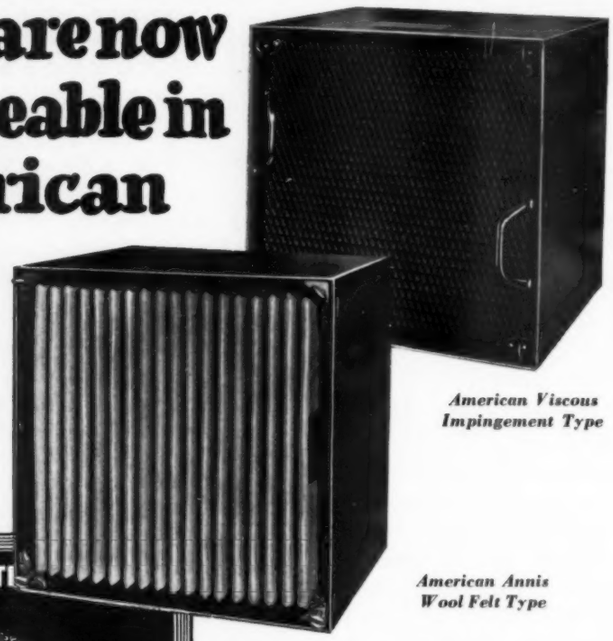

American Viscous Impingement Type

American Annis Wool Felt Type

Write for this NEW Bulletin Today

For fourteen years American Air Filters have been standard equipment on a large percentage of all Diesel and gas engines and air compressors.

While in no way departing from basic design of the original type S. C. F. filter, the new line of American engine and compressor filters provides complete interchangeability of filter cells and brings to this field the most recent improvements in air filter design and construction.

The interchangeable feature of the new American Air Filter makes it possible to use either American viscous impingement type cells or American Annis wool felt cells in the same housings or frames.

The need for air filter protection against dust particles that break down the oil film between moving parts and cause excessive and unnecessary wear on pistons, cylinders and bearings is recognized throughout the industry. Write for bulletin #120-B which gives complete information.

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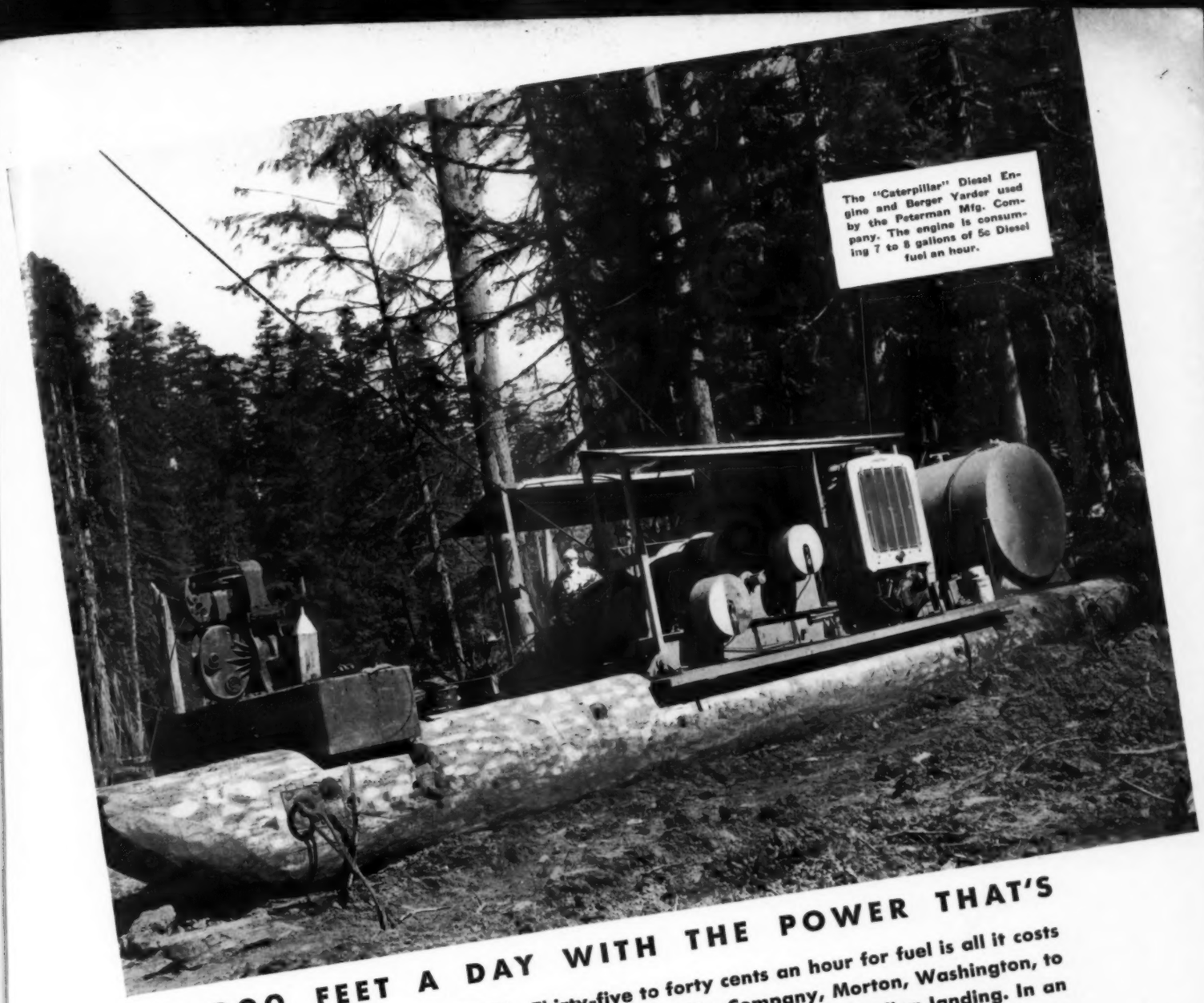

The "Caterpillar" Diesel Engine and Berger Yarder used by the Peterman Mfg. Company. The engine is consuming 7 to 8 gallons of 5c Diesel fuel an hour.

225,000 FEET A DAY WITH THE POWER THAT'S

FIRST

Thirty-five to forty cents an hour for fuel is all it costs the Peterman Mfg. Company, Morton, Washington, to yard logs from woods to truck-loading landing. In an 8-hour day they average 150,000 feet. But on one record day, the power that's first—their "Caterpillar" Diesel Engine—handled 225,000 feet! Records of results in many fields prove the "Caterpillar" the world's foremost Diesel engine—FIRST in power, endurance, dependability, low up-keep, and low operating cost. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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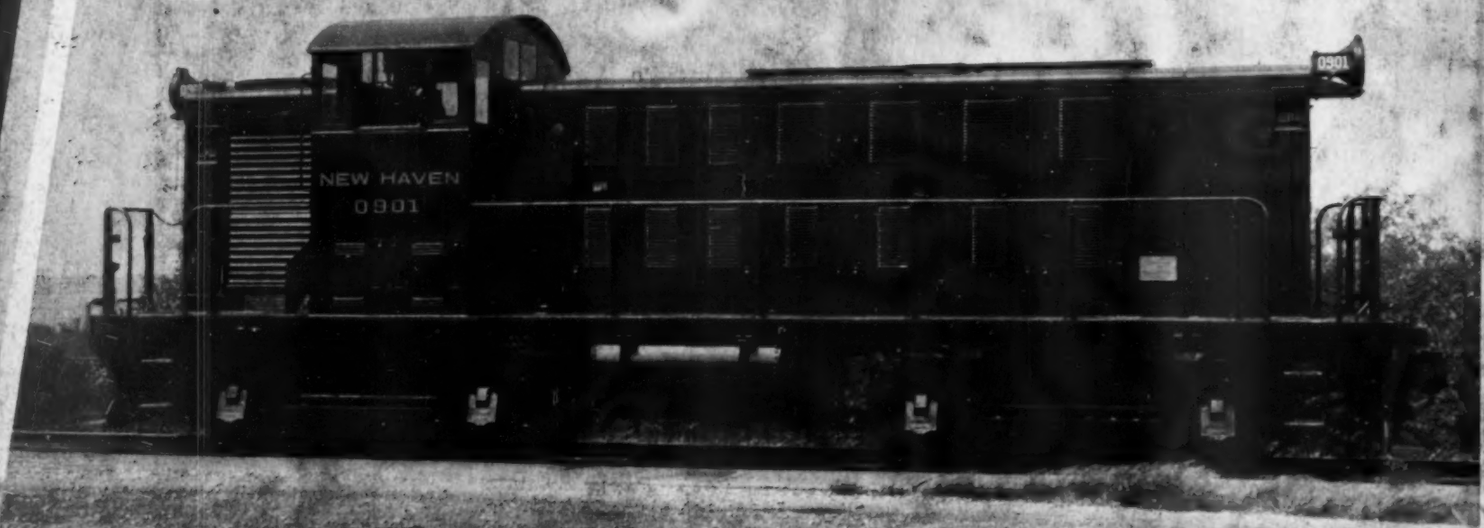
Diesel

NEW HAVEN R.R. ACCEPTS THE CHALLENGE



WITH DIESEL LOCOMOTIVES

AMERICA is challenging her railroads today to do a better job with the country's transportation problems. Goods must be moved faster, cheaper, with less loss and on more definite schedules.

The New York New Haven & Hartford is one of the country's progressive roads which is meeting this challenge. The illustration shows one of five 100-ton Cooper-Bessemer Diesel electric switching locomotives which are being put into service by this road.

Cooper-Bessemer is one of the oldest engine manufacturers in this country. In building Diesel engines for locomotives nothing can take the place of experience.

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